ARCHIVES OF OPHTHALMOLOGY.

THE CAUSE OF A SPECIAL FORM OF MONOCULAR DIPLOPIA.

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(*With three illustrations.*)

EVERYONE is familiar with the monocular diplopia and polyopia resulting from certain forms of cataract, and also with that due to certain pathological malformations of the iris. Less well known, though much more common, is a form of diplopia occurring in many cases of astigmatism, or which may be brought out in the case of most normal eyes by placing concave cylindrical lenses before them. In fact this latter form of diplopia, so far as I know, has been discussed by few writers. In 1896 G. J. Bull,[1] of Paris, published an article that was largely devoted to a consideration of this subject. His theory as to the causation of this form of diplopia I believe to be erroneous, and it is my purpose here to offer a more satisfactory explanation.[2]

As regards the doubling of lines, this form of diplopia may be considered normal, for it occurs in the majority of normal eyes. The fact that it is not recognized more often is probably due to two causes, one being that each axis of the astigmatic charts now most used is made up, not of a single line, but usually of two or more lines; the other reason is that in the majority of instances the phenomenon is

[1] *Transactions of the Ophthalmological Society of the United Kingdom*, vol. xvi., p. 204.

[2] Parinaud, in Norris and Oliver's *System of the Diseases of the Eye*, maintains that it is this form of monocular diplopia that manifests itself in cases of hysteria and other nervous affections. His explanation of it is practically identical with that of Bull. Vulpian, in 1861, and Donders, in 1864, also described the phenomenon, and assigned a similar explanation for it.

most noticeable when the lines are blurred by rendering the eye hypermetropic, while it is the rule, properly enough, in using astigmatic charts to render the eyes myopic. Although the two or three stripes in the axis of an astigmatic chart render it impossible for the patient to realize that he may be seeing each of the lines double, nevertheless the doubling occurs, and may cause an inaccuracy to enter into the test for astigmatism. I always prefer single lines in my charts, for if there is any such phenomenon taking place I wish to know of it and to take special precaution against its leading to error.

The phenomenon may be well seen by most persons by viewing a narrow black line at a distance of about 30 *cm.* On relaxing the accommodation the line will be seen to break up into two. More striking, however, is the diplopia which may be produced by viewing the ordinary test type at 6 M through a concave cylindrical lens of 1.50 D or 2 D placed horizontal, or better still, through a stenopaic slit placed vertical and combined with — 2 D S. If care is taken to keep the accommodation relaxed, the smaller letters will be seen in double rows one above the other, and entirely separated from each other. The larger letters will be seen to be double, but the doubling is not sufficient to cause complete separation.

Bull's explanation of this interesting phenomenon is that the sectors of the crystalline lens act as separate lenses and thus, when an image is blurred, produce diplopia and polyopia. By close attention Bull was able to distinguish other lines besides the two main ones into which a line was broken when blurred. I also have noticed these secondary lines, but prefer to speak of the phenomenon as that of diplopia, rather than polyopia, because diplopia is by far its most marked as well as its most constant feature.

There are several objections to Bull's theory. In the first place it seems unlikely that the lens sectors could have the required differences in focus without markedly impairing vision, but as a matter of fact the phenomenon may still occur when the vision is above normal. In my own case, for instance, the phenomenon is most distinct, and even

without the correction of a slight amount of astigmatism I have always vision of $\frac{20}{xv}$ and sometimes of $\frac{20}{x}$. Another most important objection is the fact that if a small black spot is blurred by relaxing the accommodation it is apparently converted into a more or less perfect ring. This would not be the case if Bull's theory obtained, for in that case it should be converted into a series of small dots. Again, according to Bull's theory it should be possible to place a line in such a position that there would be at least three equal or nearly equal images, but with me such is not the case, diplopia always remaining the predominating feature. If Bull's theory were correct it would be expected that a stenopaic slit could be rotated to a position at which diplopia could not occur, but with me such is also not the case.

To a certain extent I think Bull was misled by the study of what he called his "star." In viewing a very bright though small source of light, the very slightest deflections in the rays from it, while passing through the dioptric media of the eye, are rendered prominent, whereas in viewing a black line or black spot many such deflections are entirely invisible. Moreover, it seems likely that some of the so-called rays of a star are due to dispersion of light in the retinal layers, notwithstanding the fact that the latter are reduced in number and thickness at the macula. This is suggested by the fact that these rays are still plainly visible even when the source of light is viewed through a very small stenopaic opening, provided the source of light is sufficiently bright. I do not doubt that the appearance of a small blurred source of light is influenced in a more or less definite way by the structure of the lens, but it does not seem to me as if this influence is sufficiently marked or of such a kind as to play an essential part in the phenomenon under discussion.

By the use of a photographic camera I have made some experiments that go to show that the phenomenon is due solely to spherical or, more generally speaking, to symmetrical aberration. In making his photographs, Bull made use of the most perfect lens at his disposal, one corrected for

both spherical and chromatic aberration, and with this he was unable to reproduce the phenomenon in question. Now it is well known that these aberrations, in the case of the eye, instead of being corrected are, in fact, often exaggerated. I think that this fact renders Bull's entire series of photographs of much less value than if he had used a simple uncorrected spherical lens.

In my experiments I made use of a simple spherical lens, 11.5 *cm* in diameter and having a focal length of 26 *cm.* With it I was able to reproduce beautifully the diplopia of both lines and letters. To produce diplopia in lines, all that was necessary was to "focus" the camera so as to render it hypermetropic. It being difficult to obtain a sufficiently large cylindrical lens for producing diplopia in the letters, I

FIG. 1.

used the better method of the stenopaic slit, the latter being made 2 *mm* wide. Fig. 1 is produced from a photograph taken in this way. Black letters on a white card show the phenomenon almost as well on the ground glass of the camera as white letters on a black card, but the former letters do not come out so well on the plate.

Since this phenomenon does not occur when a lens corrected for spherical and chromatic aberration is used, it follows that it must be due to one or both of these aberrations. Chromatic aberration may be excluded by the fact that the phenomenon still occurs when a monochromatic

light is used. Knowing, then, that spherical aberration is alone sufficient to account for the phenomenon, and knowing how great is the symmetrical aberration of the eye, it would seem like folly to attempt to assign any other cause for it. It is not difficult to understand how symmetrical aberration produces this effect. Fig. 2 is intended to represent a case of positive symmetrical aberration; the rays from

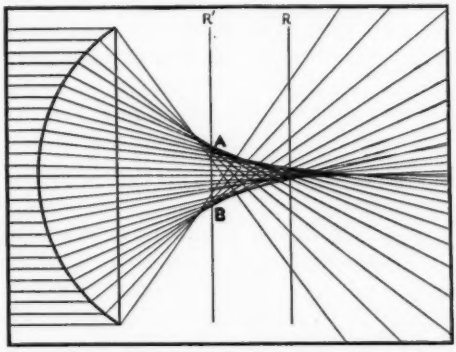

FIG. 2.

the peripheral portions of the lens therefore intersect at points nearer to the lens than the rays from the more central portions. When the retina is at R′, a condition of hypermetropia, it is evident that there will be two areas, A and B, that will be more intensely stimulated, either by an excess of light, as in the case of a bright object, or by a lack of light, as in the case of a dark object, than any other portions of the diffusion circle. This shows that a spot under these conditions would be represented on the retina by a ring, while a single line would be represented as two lines. If when the retina is at R′, and practically only one meridian is out of focus, a condition that could be produced by means of a concave cylindrical lens or by a stenopaic slit combined with a concave spherical lens, it follows that diplopia of any sort of an object, for instance a letter, must occur. If, on the other hand, the retina is at R or beyond, it follows from the character of the diffusion circle that no

diplopia could be obtained, and in the case of a spherical lens it can be shown experimentally that no diplopia does occur under this condition.

In the case of negative symmetrical aberration it is evident that the conditions are exactly the reverse of those just described. Here it would be necessary to render the eye myopic to obtain diplopia. Where the aberration is not symmetrical—that is, positive in one half of a meridian and negative in the other, a condition revealed by the scissors movement in skiascopy,—no marked diplopia could occur in that meridian.

Fig. 2 explains the well-known fact that test letters usually appear most distinct through a concave lens or when in any way the eye is rendered slightly hypermetropic, for it is evident that the edges of the letters, corresponding to A and B in the figure, are more sharply defined than when there is an emmetropic condition. I do not believe that heretofore this fact has been correctly explained.

It is not possible to reproduce with a spherical lens all the optical phenomena connected with the eye, for the reason that the refractive qualities of an eye can rarely be represented in a spherical surface. For instance, as already explained, when a myopic condition is produced in the camera, no diplopia occurs in either lines or letters. In my eyes, however, I find that this does not obtain, for under the myopic condition I still get diplopia, although far less distinctly than when the hypermetropic condition is produced. I at one time thought that this variation from the action of a spherical lens was due to the fact that the nucleus of the crystalline lens offered more obstruction to the rays than the periphery of the lens. I have explained elsewhere[1] how a sufficiently dense nucleus could produce diplopia, much in the same way that a pin held in front of the eye produces a white streak in the middle of a blurred line. A few experiments with my large lens, however, soon convinced me that this was not the true explanation, for to obtain an appreciable effect it was necessary to blacken the

[1] F. H. Verhoeff, "Shadow Images on the Retina," *Psychological Review*, Jan., 1900, p. 18.

centre of the lens to an extent which would be immediately noticeable if its equivalent occurred in the crystalline lens.

The true explanation, I think, lies in a peculiarity of the corneal or lens curvature. If there were positive aberration at the periphery of the cornea and negative aberration at the more central portions, diplopia would occur under both the myopic and hypermetropic conditions, as illustrated in

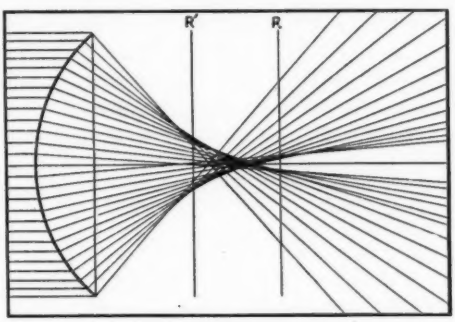

FIG. 3.

Fig. 3. I believe Fig. 3 to represent qualitatively the refractive conditions of the vertical meridians of my own eyes, with the exception that the two halves of each meridian are not quite so symmetrical as here represented. In support of this view is the fact that with me the diplopia occurring under myopic conditions is most distinct when the refraction is limited to the central portions of the dioptric media by means of a stenopaic opening, while, on the other hand, the diplopia resulting from the hypermetropic condition is most marked when the stenopaic opening is not used.

Finer lines than those mentioned, sometimes seen when a line is blurred, are most often due to tears flowing over the cornea, for they disappear or change their positions on winking. Other possible variations in the phenomenon no doubt could be produced by special peculiarities in the aberration of the eyes.

By sawing a lens into several sectors and then mounting the sectors together again, Bull was able to produce polyopia. It seems to me that this was a useless experiment, for

it must be evident to anyone that the sectors of a lens divided in this way could be mounted so as to give almost any degree of polyopia. This could not be done, however, without markedly impairing the definition of the lens. If the sectors of the lens were mounted so as to preserve their original relations, which would be a very difficult thing to do, the only factors that could possibly cause polyopia would be the lines of junction of the sectors, and these would not be wide enough to render the phenomenon noticeable. A study of the refractive structure of the crystalline lens by the pin-hole method does not reveal sufficiently marked lines of junction to account for the phenomenon, and the acuity of vision of the eye, as already brought out, excludes the idea that the sectors of the crystalline lens could act in the same way as the badly mounted sectors of a divided lens.

In case there was positive symmetrical aberration in one meridian and negative aberration at right angles to it, it is easy to see how astigmatic charts might give indications which would lead to the prescribing of a cylindrical lens where perhaps it was not needed. It is possible that a cylindrical lens would do no harm here, but it is likely that it should be opposite in sign to that which the tests as usually made would indicate. I am sure that I have met with cases which presented these features in a slight degree, but the latter were not sufficiently marked to admit of a great error being made. Where charts made with single lines are used, it is possible to detect the diplopia and to determine the real conditions, but when each axis of an astigmatic chart consists of three lines, the double images of the separate lines at times may reinforce each other and thus interfere with the correct determination of the amount of astigmatism.

I do not believe that these facts are sufficient grounds for doing away with astigmatic charts. On the contrary, I believe that when they are properly used, astigmatic charts offer the most accurate known method of measuring astigmatism, and even if the finer precautions are not taken, I think that fewer errors will be made than if the test letters alone are used.

ON THE HISTOLOGY AND DEVELOPMENT OF LENTICONUS POSTERIOR.[1]

By Dr. S. BÄCK.

Translated by Dr. Ward A. Holden.

(*With three figures on Plate VI. of Vol. XXXVI., German Edition.*)

ONLY recently has the interesting malformation of the lens known as lenticonus posterior been the subject of histological investigation, although clinically the characteristic clinical picture has long been recognized.

The first accurate histological examination was made by Hess (*Graefe's Archiv*, xlii., p. 234, 1896), who described the condition as follows: The anterior segment of the lens, the capsule, epithelium, and lens fibres are normally formed, and the arrangement of fibres and of their nuclei is normal. Just behind the point where the epithelial cells pass over into lens fibres, on each side, there is a slight incurving of the margin of the lens. Up to this point the capsule maintains nearly its normal thickness. Toward the posterior pole the capsule grows thinner without being broken. The fibres of this posterior segment are normal in appearance, although many of them are bent and distorted, and at many points masses of granular detritus lie among them. There was no trace of a hyaloid artery in this case or in another that was similar except for the fact that the masses of fibres were swollen and irregularly arranged. The capsule in this case also was much thinned posteriorly and Hess concluded that in the embryonic period there had been a solution of

[1] From the University Eye Clinic at Breslau.

continuity. There was no nucleus present; at the posterior pole there was a slight cloudiness of the lens, visible ophthalmoscopically. In the other eye of the same animal there was an opacity at the posterior pole of the lens but no conus. Hess concluded that the same process which caused the disturbance in the development of the lens fibres at the posterior pole had decreased the resistance of the capsule at this place, so that, in one eye at least, it yielded to the intracapsular pressure and was forced backward. This view, that lenticonus posterior arises from a rupture of the posterior capsule which has taken place in embryonic life, was further discussed by Hess at the twenty-fifth Heidelberg Congress. In four out of five cases he had found this rupture. In all cases the nucleus of the lens was displaced backward into the conus, since the posterior fibres had grown out through the opening in the capsule.

Pergens (these ARCHIVES, xxviii., 6) described a case of buphthalmos with lenticonus posterior in man; there being also an anterior pyramidal cataract and posterior synechiæ. Furthermore, the cortex was completely broken down and the conical nucleus was dislocated toward the posterior surface of the lens, but it could not be determined whether this was primary or the result of the cataract.

The antero-posterior diameter of the lens was 7.6 *mm*, the transverse 9 *mm*. Pergens believed that the large size of the lens for a child of 4½ years was, in the sense of Priestley Smith's view, the cause of the hydrophthalmos. It should be mentioned, however, that in the other cases examined anatomically and in my case also there was no glaucoma in spite of the large size of the lens.

The condition of the posterior capsule could not be determined in Pergens's case on account of poor preparations. No remains of a hyaloid artery were found.

In the Heidelberg Congress of 1897 Bach showed several preparations from a case of lenticonus posterior in which the intimate connection between this malformation of the lens and the hyaloid artery was shown. In all of Bach's cases the posterior capsule was perforated and in one could be seen the piece of capsule that had been forced out, now

lying in the tract of connective tissue extending to the disc. Bach distinguishes between a lenticonus and a lentiglobus posterior.

I have myself found the same changes in a rabbit's eye while making experiments on contusion of the ball. This particular eye, however, had not been experimented on and was intended to be used as a control eye. In one eye there was an extensive rupture of the capsule of the lens, while in the other eye of the same animal, which also exhibited pronounced lenticular changes, there was no rupture.

The greatest breadth of the ball was 13 *mm*, the antero-posterior diameter, 11.5 *mm;* the greatest antero-posterior diameter of the lens was 8 *mm*, and its greatest lateral diameter 7 *mm*, while in a normal eye of a rabbit of the same age the antero-posterior diameter of the lens is 3.5 *mm*, and the lateral diameter 6–6.5 *mm*.

Thus the lens is markedly enlarged in all diameters, but more particularly in its antero-posterior diameter, on account of the extension of the lens toward the posterior pole of the eye. Even when but slightly magnified these posterior portions of the lens are seen to be somewhat split apart. Their limiting surface is irregular, but on the whole it presents a blunt, conical projection directed towards the disc. It is also clearly to be seen that the posterior portion of the lens is surrounded by delicate fibres which unite to form a tract which ends at the optic disc (Fig. 1, Pl. VI.). The masses of lens fibres pass to the apex of the cone, meeting at an acute angle. Where they meet lie irregular, dark, degenerated masses, forming a line in the lens running from before backwards. The enlarged, somewhat conical, and abnormally pale nucleus of the lens is elongated backward by following the direction of the lens fibres.

The capsule of the lens, in excentric sections from the upper third of the lens which do not include the conical projection, is, in its anterior half, normal, as are also the underlying epithelium and fibres; but toward the posterior pole pathological changes become visible. The fibres here lose their regular shape and become separated, spaces and masses of detritus appearing among the swollen fibres. These changes are well marked at the posterior pole. The fibres which meet here form a cone with its apex directed posteriorly toward the capsule, which here is thin.

Sections through the middle third of the lens show more

marked pathological changes, and the capsule of the lens is wanting at the posterior pole. The fibres pass through this opening in the capsule and are regularly arranged posteriorly, being surrounded by fibrillar tissue which makes up the tract extending to the optic disc (Figs. 1 and 2, Pl. VI.). Near the apex of the cone the fibres are broken down and the ordinary cataractous changes are present. The connective-tissue tract here loses its nuclei and passes in a diffuse manner into the optic nerve, neither containing vessels itself nor appearing to be in connection with vessels of the retina or nerve.

The extensive opening in the capsule leads one to regard this as the cause of the changes in the lens. The possibility that the capsule was ruptured in consequence of the change in the fibres is less likely.

It would seem then that the malformation of the lens has come about through changes in the posterior capsule. These were doubtless due to processes which took place while the hyaloid artery and tunica vasculosa lentis were undergoing absorption, for as the remains of such must be considered the fibrillæ about the posterior portion of the lens and the connective-tissue tract extending to the disc. It may be assumed that the strong traction on the posterior portion of the capsule led to a lessened resistance and a yielding at this spot. The lens fibres, developing, possibly extended toward this spot as one of least resistance, and thus the lens became unsymmetrical. But the cataractous condition of the posterior portion indicates that when the capsule ruptured, liquids entered and the lens fibres swelled up and protruded through the opening like a hernia. The enveloping fibrillar network, however, furnished a protection and prevented the absorption of the protruding fibres.

The condition of the lens in the other eye is of great interest. The eyeball was 11.5 *mm* in antero-posterior diameter, and 13 in lateral diameter; while the lens was 7 *mm* in antero-posterior and 7.5-8 *mm* in lateral diameter. The lens was thus abnormally large, particularly in its antero-posterior diameter; still there was no cone at the posterior pole.

The capsule with its epithelium and underlying fibres was normal in the anterior portion of the lens only. Toward the posterior

pole it became markedly thinner. The lens fibres, as in the other eye, came together posteriorly at an angle, whose apex was directed backwards (Fig. 3). At the posterior pole the fibres are separated and in part degenerated, enclosing among them vacuole-like spaces and masses of granular detritus. From the middle of the posterior pole a perpendicular cleft extends into the cortex, which also is filled with detritus. The capsule of the lens, however, is normal at this spot. The condition of the lens at the pole resembles that found in cases of fusiform cataract. No remnant of a hyaloid artery is to be found.

If we now compare the changes in the two eyes we may with a fair degree of certainty assume that the changes found in the second eye represent an earlier stage of the process existing in the first. Here also there was a diminution in the resistance of the posterior capsule; and here also the masses of lens fibres meeting at an angle and exerting pressure upon the weakest portion of the capsule greatly thinned the latter, but did not actually rupture it. Probably there was here also, in fœtal life, an abnormal traction on the part of the hyaloid artery, but this did not continue since the artery became entirely absorbed; in the first eye remains of the artery continued and contracted, rupturing the capsule. My findings thus agree with those of Hess and Bach.

My thanks are due to Professors Uhthoff and Axenfeld for assistance in this investigation.

ON ELEPHANTIASIS LYMPHANGIOIDES OF THE LIDS.

By Dr. GIACOMO ROMBOLOTTI, Milan.

Abridged Translation by Dr. Ward A. Holden.

(With four figures on Plates X.–XI. of Vol. XXXVI., German Edition, and one figure in the text.)

THE term "elephantiasis," as Saboureaud justly remarked, has survived many analogous terms of the older medicine. It served to designate many forms of disease which now are more accurately classified, and to-day the term is used with reference to carefully defined morbid conditions, consisting in a marked increase in the volume of the affected parts of the body and in hypertrophy of all the cellular elements of the skin and subcutaneous tissues. From a clinical standpoint, many authors have differentiated a congenital and an acquired form. For the tropical forms the filaria sanguinis humani has been held responsible in many cases, but this of course could not be the cause in cooler climates.

Saboureaud, however, has discovered the micro-organism whose proliferation causes a recurring lymphangioitis which leads to pachydermia elephantisiaca. The constant statement of the patients that an erysipelas preceded or accompanied the affection or appeared during the so-called crises of elephantiasis led Saboureaud to study the matter and to examine serum and blood obtained by scarifying the inflamed part while one of the crises was existing. Cultures of the streptococcus of Fehleissen always were obtained. This was

what he expected to find, and he regarded the bacteriological examinations as explaining the clinical and pathological findings. Clinically, the affection is characterized by a paroxysmal course with the crises of elephantiasis, and intervals of rest and diminution of volume in the affected limb without full restitutio ad integrum. Pathologically, chronic lymphangioitis was found, which corresponds to the course of the affection and the genesis and site of the alterations. The streptococcus is the principal micro-organism. In elephantiasis of the lower extremities the recurrences are due in part to the dependent position of the limbs.

The case I wish to report not only furnishes a contribution to the pathology of this affection of which little is to be found in ophthalmological literature, but shows an evident clinical connection between a series of erysipelatous inflammations of the face and the development of elephantiasis.

Van Duyse,[1] in his paper on this subject, stated that he had not found this clinical sequence, and he believed that from birth there was a certain degree of tissue hypertrophy in those parts that later developed elephantiasis. He cited Walzberg's case in which the patient had at birth a hypertrophied eyelid which increased in size in consequence of repeated inflammations. Van Duyse believes that the repeated inflammations in certain cases are merely accidental and act upon an already existing congenital local predisposition.

The following cases, more or less analogous to mine, have been reported:

DeWecker, in his text-book, speaks of a woman whose lids became greatly swollen and pendulous without causing her any pain and without being preceded by any eruption or inflammation. Another negative case was reported by Tellais.[2] But it is not impossible that in these cases the condition of the lids was a local expression of a general leukæmia—such cases having been described by Leber[3] and by Chauvel.[4]

Pedraglia and Deutschmann[5] reported a case under the

[1] *Ann. d'ocul.*, 1889. [2] *Arch. d'opht.*, 1882. [3] *Graefe's Archiv*, xxiv., 1.
[4] *Gaz. hebdom.*, No. 27. [5] *Graefe's Archiv*, xxxiv., 1.

title "Chronic Œdema of the Lids with Erysipelatous Inflammation." The patient, a boy of fourteen, had suffered for several years from a bilateral swelling of the lids. The overlying skin had an erysipelatous redness. The authors attributed the chronic œdema to recurring attacks of erysipelas.

Lauraud [1] reported a case of chronic œdema of the lids in a boy of fourteen. The author believed the œdema to be due to a recurrent facial erysipelas.

Liebrecht [2] presented a patient with tumor formation limited to the lids. Leukæmia did not exist. The patient stated that he had suffered from frequent attacks of facial erysipelas, but that increased swelling of the lids never followed immediately after an attack. The diagnosis was left open. Behrend, in the discussion, pronounced it a case of elephantiasis due to recurrent inflammation.

Fage [3] treated a woman who had had almost regular monthly attacks of facial erysipelas ever since her first menstruation at the age of twelve. By the time she was seventeen, the lower lids were so enlarged that they appeared to be two great tumors.

Analogous to this case is one reported by Polignani,[4] who was the first to make a histological examination. The patient was a young woman who had had so many attacks of erysipelas that she could not remember the first. The lower lid was greatly swollen. When incised, an opalescent bloody-colored liquid could be expressed. Cultures of this liquid proved negative and inoculations in animals were not followed by infection. A bit of skin with the underlying tissue was removed and examined. The subcutaneous tissue was made up of a spongy meshwork-like tissue with scattered fibrous nodules. Two sorts of meshwork could be distinguished, one representing a dilatation of the lacunæ of the subconjunctival tissue, and the other, a closer-meshed tissue, representing a dilatation of the lymph vessels of the part.

[1] *Sem. méd.*, 1889.
[2] *Deutsche med. Wochenschr.*, 1889, 50.
[3] *Ann. d'ocul.*, 1892.
[4] *Raccolta dei Lavori d. Clin. Ocul. di Napoli*, vol. iii.

The changes were due to a recurrent erysipelas. In the subcutaneous tissue there was a small-celled infiltration with a lymphatic œdema of the stroma and a secondary cystic and canal-like dilatation.

My case was as follows:

A. C., a woman of fifty, was received into the general hospital at Milan, September 14, 1894. The patient was healthy up to her nineteenth year, when she had an attack of facial erysipelas which repeatedly recurred after longer or shorter intervals. After several of the recurrences, an inflammatory swelling of the lids set in which only partially passed off and the lids became as large as they were at the time of her admission. An operation was then undertaken in order to relieve the deformity, but, the attacks of erysipelas still recurring, the lids became as large as before.

St. pr.: The lids, particularly the lower, are enormously increased in size and give one the impression of being dependent pockets attached by a broad base to the orbital margin (see photograph). The right pocket nearly equals the left in size. Its

vertical diameter is 30 *mm* and its horizontal 35 *mm*. The skin is smooth, very pale, slightly reflecting, and suggests the skin of an œdematous lid. When palpated the pocket is more resisting than simple œdema. On pressure it decreases in volume gradually and offers the same sensation as is obtained by squeezing

out a wet sponge. The free margin of the lid and the tarsal conjunctiva are slightly everted. The pocket overhangs the cheek so that the skin covering the former lies for *2 cm* in contact with the skin of the cheek. Along this fold in each lid is a linear scar, concave upward.

Palpation of the entire orbital margin reveals nothing abnormal. The upper lids are deformed like the lower but in less degree. The skin of the upper lids resembles that of the lower. The eyeballs are normal in position and mobility, and vision is normal.

By pricking and then compressing the lower lids one can obtain a small quantity of a liquid which is at first transparent and later becomes tinged by an admixture of blood.

Examination of the lymph glands, viscera, and blood revealed nothing abnormal.

The director of the eye division of the hospital, Dr. Denti, operated on the right lid as follows : The skin was dissected up nearly to the free margin of the lid and several layers of the subcutaneous tissue removed until a smooth surface was obtained. The excess of skin was removed and the remainder brought into place. The result cosmetically and as regards function of the lid was excellent. The patient, however, left the hospital at once and no operation was done on the left side.

Histological examination : The portions of tissue removed from the lid were hardened partly in bichloride of mercury, partly in alcohol and bichromate of potassium, and were imbedded in paraffin and cut with a microtome. The sections were stained in various ways which will be spoken of later. A rapid glance at the specimens showed that the excised tissues consisted principally of skin and enormously hypertrophied subcutaneous connective tissue which reached a thickness of several centimetres. Only in the central and deeper layers of the tissues in some specimens were found muscle fibres, evidently from the orbicularis.

With a more careful examination it was seen that the same changes existed in both skin and subcutaneous tissue, although they were more marked in the latter.

The epidermis (Fig. 1, a,a,a, and Fig. 2, a,a,) has preserved its three layers perfectly, and it fills in the interstices between the papillæ regularly. In its deeper layers there is no sign of pigmentation — a condition always found in

elephantiasis,— whence the absence in the lids of the brown color usually found in elephantiasis of the extremities.

The papillæ are relatively atrophied and the limit between derma and epidermis is merely a slightly wavy line.

The chorion on the contrary is greatly thickened. Its component connective-tissue bundles retain in part the peculiar wavy course that they have in the lids, but their pupils are often separated by lacunæ containing a few cells (Fig. 2, b,b) and the tissue presents a markedly œdematous appearance. This appearance is still more marked in the deeper, more vascular layers (Fig. 2, c,c). Only in the neighborhood of a few of the vessels is there a slight round-celled infiltration.

The various glands exhibit no changes whatsoever.

The subcutaneous connective tissue (Fig. 1, c,c,c), as said before, is greatly thickened and œdematous. In the meshes of the connective-tissue network lies scattered a substance which is granular in places and fibrous in others, and does not take the ordinary stains well, but by the reaction to Weigert's stain this substance is shown to be fibrin.

A considerable number of pigment cells are found in this tissue, indicating that the normal pigment cells of the part have undergone a hyperplasia with the other elements.

The vessels (Fig. 2, f,f) are distended with blood, which in part explains the histogenesis of the connective tissue by hypertrophy.

Since it is generally believed that plasma cells (connective-tissue cells containing granules which take the methylene-blue stain) are found abundantly in tissues in which there is evidence of lymph stasis, I stained sections by Fiorantini's[1] method and found plasma cells present in much greater number than in normal tissue, and lying mostly about the vessels which in transverse section appeared completely encircled by these cells.

In the deepest layers of the subcutaneous tissue were small islets of fatty tissue, likewise containing plasma cells, and bundles of fibres of the orbicularis muscle (Fig. 3, a,a,a). The latter were separated by connective-tissue septa of fairly

[1] Atti della Assoc. medica Lombarda, 1895, No. 3.

uniform thickness, containing great numbers of fixed cells and infiltrating leucocytes (Fig. 3, b,b). This alteration in the orbicularis suggested that found in myositis interstitialis chronica, and the more so since the sarcolemma nuclei were very numerous. The fibres themselves often appeared separated from one another and surrounded by an empty space evidently produced by lymph stasis (Fig. 3, d,d). At other points it was found that the œdema had affected the fibres themselves, which appeared shrunken.

The sarcolemma nuclei are much more numerous than in the healthy state (Fig. 4).

The microscopic changes found in my case—the great number and dilatation of the vessels, the enormous hypertrophy and œdema of the subcutaneous connective tissue, and the accumulation of lymphoid cells and plasma cells—represent the residua of repeated inflammations, as the clinical history showed.

In general, my findings agreed with those of Polignani, although in my case there was no extensive network of lymph spaces lined with endothelium; but this absence may be explained by the fact that an operation had been done in my case four years before and the tissues I examined represented a reproduction of those originally present.

As regards the return of the elephantiasis while the causative factors still exist, I would say that in this case even after the second operation the lid in time again became as large as the other. For this reason many authors have spoken of elephantiasis lymphangioides of the lids as a neoplasm which is benign but, like other benign tumors, has a tendency to recur. Virchow, however, classes it as simple lymphatic œdema, and De Wecker as a hypertrophy of the skin.

The pathogenesis of elephantiasis lymphangioides is as follows: The immediate effect of the recurrent erysipelas is a dilatation of the blood-vessels, and particularly of the veins, which yield most readily. Thus the return flow is impeded and the serum of the blood passes out of the capillaries under the high tension, and this transudation

leads to œdema. If no fresh inflammation comes on, these pathological conditions may disappear, but if a recurrence takes place before the tissues have again become normal, the œdema becomes chronic, and the fresh hyperæmia causes a persistent stasis, and a vicious circle is set up. The transudation in the tissues then assumes new characteristics. It becomes denser and more fibrinous and finally it disturbs the nutrition of the part, increases its formative activity, and thus leads to the tremendous hypertrophy of integument and subcutaneous tissue which characterizes elephantiasis.

Conclusions: The formation of the hypertrophic tissues in my case is doubtless of lymphatic origin, arising from repeated lymphangioitis, which causes a permanent alteration of the lymph channels—the most important factor in elephantiasis. Each of these inflammations leaves its trace — an increasing number of cellular elements which gradually become organized and, together with the hyperplasia of the fixed tissue elements resulting from the disturbed nutrition, cause an ever-increasing hypertrophy of the tissues. As Sabouraud demonstrated for elephantiasis of the lower extremities, so also for elephantiasis of the lids the pathological anatomy is in complete accord with the ætiology, and the streptococcus is the pathological cause of the elephantiasis, this being brought about by the recurring attacks of lymphangioitis which are caused by the streptococcus.

Explanation of the Figures.

Fig. 1. Skin and hypertrophied subcutaneous tissue of the pocket in the lid.

a, a, a, epidermis.

b, b, b, derma.

c, c, c, hypertrophy of the subcutaneous tissue.

Fig. 2. Superficial portion of the section shown in Fig. 1, highly magnified.

a, a, a, epidermis.

b, b, connective-tissue bundles of the chorion, separated by lacunæ.

c, c, more marked lacunæ in the deeper layers of the chorion.

d, d, subcutaneous connective tissue with its fibres separated by lacunar spaces.

f, f, blood-vessels with an infiltration of lymphoid cells about them.

Fig. 3. a, a, bundles of fibres of the orbicularis muscle, separated by septa b, b, which contain infiltrating lymphoid cells ; c, c, transverse section of muscle fibre. The muscle substance, d, d, appears shrunken so that it is separated from the sarcolemma, e, e, by a narrow zone.

Fig. 4. Transverse section of muscle fibres in which the sarcolemma nuclei are very numerous.

ON ACCOMMODATION IN APHAKIC EYES.

By Dr. O. WALTER, Odessa.

Translated by Dr. Ward A. Holden.

THERE is no longer any question but that accommodation in the normal eye is due directly to a change in the form of the lens. This must be conceded by every one, whether he inclines to the Helmholtz theory or to that of Young-Tscherning.

From this fact it should follow that in an eye in which there is no lens there can be no accommodation, and this is the general opinion. The question arises, however, whether the anatomical structure of the eye is not such that under certain conditions lenticular accommodation may be replaced by another sort of accommodation.

Förster in 1872 first called attention to this matter when he reported his observations on several aphakic eyes in young people who had the power of seeing distinctly, with the same glass, objects at various distances. The view that this implied power of accommodation was at once combated by Abadie, Nagel, and particularly Donders. The last-named, together with his pupils, Baumeister and Coert, undertook careful control experiments which led to contrary results, and he explained Förster's conclusions as being due to errors of observation.

Among other conditions, Donders stipulated that in order to prove the existence of accommodation it must be shown that the patient's vision remained equally acute for various distances. In spite of this energetic reply to Förster,

Woinow in the same year reported some carefully observed cases of accommodation in aphakic eyes.

Against Förster and Woinow have risen up a number of observers, including Mannhardt, Schöler, Mauthner, Colin, Silex, and lately Davis. Silex reported a case in which remarkably good vision for near was obtained with the distance glass, and he explains this by supposing that the patient had an extraordinary facility in interpreting diffusion circles and perhaps used the pheriphery of his lens. Davis in a similar way explains the existence of accommodation in two of his patients.

Arlt, in *Graefe-Saemisch*, is not prepared to deny that there may be accommodation.

Fukala says definitely: "Young aphakic persons possess accommodation."

Schneller supposes that accommodation may be brought about in aphakic eyes by the pressure of the extrinsic muscles, especially in looking up and down, but Sattler after careful observations denies this.

In 1885, Bickerton reported a case in which he found good accommodation in an aphakic patient.

In a dissertation by Bickerton a series of observations are reported which quite agree with Förster's, and Litten expressed himself in the same way in 1896 at a congress of physicians at Carlisle.

My own case was as follows:

Victor B., aged twenty-six, employed in a mineral-water factory, came to me in January, 1896, complaining of so great short-sightedness that he was scarcely able to do his work. This was said to have developed ten years before, after an attack of typhoid fever.

On examination I found in each eye myopia of 16 D and extensive atrophic changes in the fundus (sclero-choroiditis posterior) extending round the disc. With the correcting glasses R v = 0.1, L v = < 0.2. In February I made a discission of the right lens, following it with extraction through a corneal section made with the lance, no iridectomy being done. In April the left eye was operated on in the same way. The course was normal in each eye.

Since there was a secondary cataract on the right side, a discission of this was made. The final result was as follows: On both sides a free round pupil, responsive to light, clear in the centre, with some secondary masses in the periphery visible by oblique illumination. R v = 0.3, with + 0.75c > 0.4; L v = 0.1, with + 2.5c > 0.3. For distance + 1. could be added to the cylinders, but without improving vision.

With the right eye, with its correcting cylinder, the near point had come to lie at 28 *cm*, and at this distance the patient could read the Dahnberg's tests computed for 50 *cm*. He had, therefore, at this distance an acuteness of vision of 0.5 with his distance glass. The next larger tests, computed for 75 *cm*, could be read by the patient at 25–35 *cm*, which again corresponds to an acuteness of vision of 0.5.

With the left eye the patient could not read with the cylinder alone, but required the addition of + 3. D, with which test type computed for 1. metre could be read at 30–40 *cm*, corresponding to an acuteness of vision of 0.3.

It is remarkable that in this case the same patient had two eyes of similar structure but of different function, the eye with poorer vision before the operation having better vision and the ability to see near objects with the same clearness as distant objects without being obliged to resort to a convex lens, as was necessary for the other eye. It should be noted again that a discission of the secondary cataract was done on the first eye.

We find in the right eye all the conditions which Donders required for proof of the existence of accommodation, viz., the establishing of the fact that the acuteness of vision was the same for different distances. With the incomplete apparatus of the institute here I was unable to make the accurate examinations which Woinow made, and I was compelled to rely on the tests with Dahnberg's figures and hooks. I believe, however, that the comparison of the two eyes is sufficient proof that the patient does not extensively make use of the dispersion circles, since if he had done this with one eye he would also have done it with the other. And it must be accepted that conditions exist in the right eye (and are wanting in the left) which enable the patient to see both distant and near objects clearly with the same glass, for he

laid aside the convex glass given to him for reading, preferring to read without any glass whatever, since even the cylinder was of little assistance in near work.

In order to see clearly at different distances, an aphakic eye must either have the power of increasing or diminishing its refractive power, or the eye must be capable of lengthening and shortening its sagittal diameter, or, finally, it must possess the power of doing both.

The refracting power of an aphakic eye can, however, only be increased by increasing the corneal curvature or by increasing the refraction of the ocular contents.

Woinow, in his cases, was unable to find any increase in corneal curvature, even by the most careful ophthalmometric examinations. Davis thinks he found such changes. In my case I was unable to detect with the naked eye any change in the size of the corneal image of a flame.

Woinow admits the possibility, further, that refraction might take place at the anterior surface of the vitreous, but he dismisses this possibility by calling attention to the similarity in refractive index of the aqueous and vitreous humors.

It seems to me, however, that this possibility should not thus be summarily dismissed, for the investigations in regard to the refractive index of the vitreous have led to greatly differing results. According to Krause the index of refraction of the vitreous is 0.0065 higher than that of the aqueous. According to Chassat the difference is only 0.001, according to Brewster 0.0028, and according to Helmholtz 0.0017. Aubert and Matthiessen find the refractive index of the vitreous only 0.002 higher, and Hirschberg found it even 0.001 lower than that of the aqueous.

The latter investigator followed Abbé's method of putting a capillary layer of the liquid between the hypotenuse surfaces of two prisms. The vitreous, however, is not a liquid but a delicate, very watery tissue, and it is possible that the compression of the vitreous between the prisms changed its normal structure and thus its refractive index.

Furthermore, it is not a matter of indifference what portion of the vitreous is examined. According to Schwalbe

the vitreous is not a homogeneous tissue, but in man it is richer in fibre and poorer in liquid constituents in the periphery than in the centre; in animals the contrary is the case. It is, therefore, comprehensible that the refractive index may differ for different parts. Furthermore, we know that the consistency of the vitreous differs greatly in different persons and generally decreases with age.

On the ground of these theoretical considerations we may assume the possibility of there being eyes in which considerable differences exist between the refractive indices of the aqueous and vitreous, which would influence the refraction of aphakic eyes.

We would thus explain the accommodation in the following way: At the place where the lens formerly lay we have in the aphakic eye the anterior surface of the vitreous. Under the influence of the contraction of the ciliary muscles—*i. e.*, in accommodation—the choroid, according to Hensen and Völkers, is drawn forward, and perhaps the vitreous also, whose anterior surface is now pressed against the iris. We can conceive that under the influence of the contraction of the ciliary muscle and the choroid the cavity of the ball becomes smaller. In some cases the vitreous must be forced through the only open space—viz., the pupil—and present in the anterior chamber. The presentation in the anterior chamber will vary according to the size and form of the pupil and the consistency of the vitreous. The condition of the iris will also play a rôle, since according to its degree of resistance it will be pushed forward with the vitreous or will act as a tense diaphragm offering a resistance to the periphery of the vitreous, thus increasing the protrusion of vitreous through the pupil. A similar rôle may be played by the posterior capsule of the lens or the hyaloid membrane, but with the opposite effect, since a greater thickness and resistance of these membranes would decrease the protrusion of the vitreous.

The form of the pupil must also be of importance because with a round pupil a spherical protrusion of vitreous would take place, but if an iridectomy had been done the protrusion would assume an ellipsoid form and an astigmatism

result, which, of course, under certain circumstances could correct a corneal astigmatism. In our hospital practice the patients have combined glasses prescribed but rarely, since they are mostly too poor to pay for them; and I now remember several cases in which a marked difference existed in distant and near vision, so that, for example, a patient with v = 0.1 for distance would read quite fine type when 3.D was added to his distance glass, and again, on the other hand, a patient with far better distant vision would be able to read large print near by only with difficulty.

That any power of accommodation should exist after a combined extraction is harder to conceive and I may cite the following observation:

A patient, aged twenty-eight, was operated on with iridectomy for soft cataract in each eye four years ago. After the operation pronounced iritis in each eye and formation of secondary cataract which has not been discinded. R v = 0.1 with + 11. D; L v = 0.3 with + 11. D (cylinders improve but slightly). There is no trace of accommodation and the acuteness of vision rapidly diminishes as the test card is brought nearer. In this case the pupil was oval and there was secondary cataract—two unfavorable conditions.

Most authors who have admitted the existence of accommodation in aphakic eyes have explained this by a so-called outer accommodation from change in the shape of the ball; either an increase in the curvature of the cornea or an increase in the sagittal diameter of the ball from the pressure of the extrinsic muscles in convergence. Only in Woinow's paper have I found a hint as to an inner accommodation from increased refraction in the vitreous, but he adds that this is physically impossible. A fourth explanation does not suggest itself.

In order to get a conception of these problems it is, before all, necessary to obtain a clear idea of the changes which must take place in an aphakic eye in order to fulfil the conditions suggested. And to do this the best way seems to be to work out the physics of the matter, which so far has not been done.

We may consider the aphakic eye as a simple refractive system having two refracting media: the air and the aqueous humor; while the refractive indices of the cornea and of the vitreous may be neglected or considered equal to that of the aqueous. If we have an aphakic eye which, as in the case reported above, is nearly emmetropic, it follows that parallel rays impinging on the cornea will be united on the retina. Taking Helmholtz's third formula, for the refraction of the middle rays by a spherical surface (*Physiol. Optik*, 2d edition, page 62), we may first compute the length of the eye, *i. e.*, the distance between the retina and the cornea. The formula is:

$$\frac{n_1}{f_1} + \frac{n_2}{f_2} = \frac{n_2 - n_1}{r}$$

in which n_1, the refractive index of the first refracting medium, the air, is 1; n_2, the refractive index of the second medium, the aqueous humor, is, according to Helmholtz, 1.3365; and r is the radius of curvature of the cornea, which, according to Helmholtz, is for persons between twenty and forty years of age, on an average, 7.882 *mm*; f_1 is then the distance of the luminous point in front of the cornea, and f_2 is the distance of the image, corresponding to the distance of the retina from the cornea.

When the eye is focussed for its far point, or infinity, the equation becomes:

$$\frac{1}{\infty} + \frac{1.3365}{f_2} = \frac{1.3365 - 1}{7.882} = \frac{0.3365}{7.882} = 0.0426$$

or since

$$\frac{1}{\infty} = 0, f_2 = \frac{1.3365}{0.0426} = 31.3\ mm. \qquad (1\ a)$$

The retina, therefore, in such an eye when in a state of rest is 31.3 *mm* behind the cornea. Such an eye has an increased sagittal diameter, for normally the length of the eye is 23–26 *mm* according to Brücke.

If we wish to compute how much the sagittal axis of the eye must be lengthened to permit distinct near vision, while the radius of curvature of the cornea remains the same, f_1 will be the distance from the eye of the object viewed. Taking the ordinary reading distance of 30 *cm* or 300 *mm*, we get the equation

$$\frac{1}{300} + \frac{1.3365}{f_2} = \frac{1.3365 - 1}{7.882} = 0.0426$$

or,

$$\frac{1.3365}{f_2} = 0.0426 - 0.0033 = 0.0393$$

or,

$$f_2 = \frac{1.3365}{0.0393} = 34 \text{ } mm. \qquad (1\text{ b})$$

The retina, therefore, must lie 34 *mm* behind the cornea, or, in other words, when the object viewed is brought from infinity to 30 *cm* the sagittal axis must be lengthened 2.7 *mm* in order that distinct vision may be obtained.

After having in 1a obtained the length of the eye when focussed for infinity, we can, with the assistance of this formula, gain information in regard to other questions.

Thus, if one wishes to know how much the radius of curvature of the cornea must change when the object is brought from infinity to 30 *cm* and the retina remains where it was, we supply the known value and compare "r" as follows:

$$\frac{1}{300} + \frac{1.3865}{31.3} = \frac{1.3365 - 1}{r}$$

or,

$$0.0033 + 0.0427 = \frac{0.3365}{r}$$

or,

$$r = \frac{0.3365}{0.046} = 7.337 \text{ } mm. \qquad (2)$$

Thus the radius of curvature of the cornea must be shortened from 7.882 to 7.337 *mm* to increase the refraction of the eye the desired amount.

With the assistance of this formula we can take up the third possibility and answer the question: How great must be the radius of curvature of the surface of the vitreous in the pupil, provided that this bulges forward with the contraction of the ciliary muscle so that a second refracting surface comes into play?

In this case we have the refracting surface no longer in the cornea but at the spot where the aqueous and the vitreous humors meet. According to Reich, the anterior

chamber, measured with the microscope in two eyes, is 3.673 *mm* deep; since now the lens is wanting and we have a deeper anterior chamber in the aphakic eye, we will suppose that the aqueous and the vitreous humors meet at a point corresponding to the centre of the lens. The lens, according to Helmholtz, being on an average 3.395 *mm* thick, this second spherical surface will lie 4.37 *mm* behind the cornea; f_2, the distance of the focal point, would then be 31.3 − 4.37 = 26.93 *mm* behind the refracting surface.

f_1, the distance of the luminous point, must here be negative, since the rays emerging from a point 30 *cm* in front of the cornea are already refracted and rendered convergent by the refracting surface of the vitreous, and they converge, as we saw in 1 b, to a point 34 *mm* behind the cornea, or 34 − 4.37 *mm* = 29.63 *mm* behind the refracting surface of the vitreous f_1 is, therefore, − 29.63 *mm*.

Keeping Helmholtz's values for the aqueous and the vitreous humors, $n_1 = 1.3365$, and $n_2 = 1.3382$.

Introducing these values we have:

$$\frac{1.3365}{-29.63} + \frac{1.3382}{26.93} = \frac{1.3382 - 1.3365}{r}$$

or,

$$-0.045 + 0.05 = \frac{0.0017}{r}$$

or, finally,

$$r = \frac{0.0017}{0.005} = 0.34\ mm. \qquad (3\,a)$$

That is, according to the supposition, the spherical projection of the vitreous must have the remarkably small radius of curvature of 0.34 *mm*. This could be possible, however, only when the pupillary opening through which the vitreous protrudes has no greater diameter than 0.68 *mm*, a pupillary diameter which is rarely seen.

This radius of curvature changes considerably when the index of refraction of the aqueous and that of the vitreous are altered in favor of the latter. If we use Krause values we obtain $n_1 = 1.3420$ and $n_2 = 1.3485$, and for r we get a value of 1.3 *mm* (3 b).

In this case the diameter of the pupil may be 2.6 *mm*, a diameter which is not rarely found.

From this it follows that the narrowness of the pupil which various authors have cited as the explanation of the apparent power of accommodation in aphakic eyes may act not only by cutting off the peripheric rays but also directly by allowing the vitreous projecting through the pupil to assume a spherical form with a corresponding small radius of curvature. We see also, from this, how important it is for the patient that he should have a round pupil, for in this case we are more likely to obtain a certain power of accommodation, which will be greater as the pupil is narrower.

If we now, with the results obtained, return to our questions, we come to the following conclusions:

I. If the accommodation of aphakic eyes, especially such as I have described, is caused by an increase in the long axis, this increase must be 2.7 *mm* for the reading distance.

An external accommodation caused by muscular pressure in the convergence position is claimed among others by Schneller. Schneller's investigations were subjected by Sattler to a most careful physiological examination, and Sattler came to the conclusion that no external accommodation takes place. His histological investigations of the sclera also led him to the conclusion that such a distension of the eyeball is improbable. In the present case it must be remembered that the eye was highly myopic, with an extensive sclerectasia, and doubtless an abnormal weakness of the coats of the eye, and particularly the sclera; it might be supposed then that the pressure of the extrinsic muscles would in this case be more likely to have some effect. Nevertheless a distension of nearly 3 *mm* is considerable, and it is doubtful whether this effect could be produced in the slight convergence necessary for fixing an object 30 *cm* away. Besides this, a portion of the radial fibres of the ciliary muscle run backward to the sheath of the optic nerve where they find their insertion, and a contraction of the ciliary muscle must bring the two points of insertion nearer together, thus shortening the sagittal axis. In my case it was incomprehensible why such an extension was possible in the right eye and not in the left when the pathological changes were alike in both. Finally, accommodation took place when the left eye was

covered and no effort at convergence was made, the left eye maintaining the position it had when fixing an object in the distance.

II. If the accommodation in aphakic eyes is due to an increased convexity of the cornea, the radius of curvature must be diminished 0.5 *mm* for fixation of an object at 30 *cm.*

In my case no change was detected in the corneal image of a flame by the coarse tests at my disposal, but no such change has been positively determined even by ophthalmometric examination.

An increased intraocular tension from compression of the eye could not cause such an increased curvature of the cornea, since, as we see in glaucoma, increased tension rather causes a bulging of the sclero-corneal ring and thus flattens the cornea. An increased curvature of the cornea could therefore be explained only through a contraction of the circular fibres of the ciliary muscle, yet, apart from the fact that such a result would be very improbable, there is no reason why such a result should occur in one eye and not in the other, since the condition of the cornea was the same in both. We therefore dismiss this explanation.

III. If the accommodation of aphakic eyes depends upon an increased refraction due to an altered form of the anterior surface of the vitreous, it can only take place when there is a marked difference in refractive index between aqueous and vitreous. Accommodation would then be favored by a round and narrow pupil and would be in inverse relation to the thickness and rigidity of the remaining posterior capsule or hyaloid membrane.

From the fact that the condition of the vitreous may be widely different in different eyes, we are also justified in believing that its refractive index may vary greatly, for the presence of even a greater or less quantity of salt in a liquid is sufficient to alter its refractive index.

With the assistance of this theory we are enabled to explain satisfactorily the difference in function in the otherwise similar eyes of our patient. A discission of the secondary cataract was made in the right eye, the vitreous could communicate with the anterior chamber through this opening,

and, under the pressure of the ciliary muscle, could protrude unchecked into the anterior chamber. In the left eye, on the contrary, the hyaloid membrane remained intact, and there was a slight secondary cataract, two conditions which must greatly diminish any such play of the vitreous.

I am fully aware that there are many gaps in my argument and I do not wish to draw positive conclusions from a single observation and theoretical arguments, but I shall consider my purpose accomplished if others will test my observations and conclusions, and undertake an experimental study of the matter. The latter would include not only careful clinical examination of myopes and others who are aphakic, but the determination of the refractive indices of the media in a large series of cases. The vitreous should receive special attention since it is to be considered not as a homogeneous mass, and it should be studied entire. The conditions are now such that I cannot undertake such studies myself.

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REMARKS ON WALTER'S PAPER ENTITLED "ACCOMMODATION IN APHAKIC EYES."

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Translated by Dr. Ward A. Holden.

WALTER endeavors to make the idea plausible that in these eyes the ciliary muscle functionates exactly as in normal accommodation, while here it only causes a change in the form of the anterior surface of the vitreous. In the following paragraphs I wish to present briefly some considerations suggested by his arguments. To begin with, one misses the experiment which would naturally first be suggested, viz., the attempt to do away with accommodation in the aphakic eye by the use of atropine.

Walter conceives that during accommodation the surface of the vitreous protrudes in a spherical form into the anterior chamber, and he computes the radius of this sphere to be from 0.37 to 1.3 *mm*, according as the refractive index of the vitreous is considered to be 0.002 or 0.0065 greater than that of the aqueous. But Walter has overlooked the fact that refraction of such a hemisphere has associated with it a very pronounced spherical aberration. Taking the second and more favorable figure, the rays from an object at a distance of 30 *cm* would form a diffusion circle on the retina 2.8 *mm* in diameter—*i. e.*, almost as large as the pupil itself. Sharp optical images can only be obtained when the incident rays deviate but slightly from the optic axis. Even if in the foregoing case we contract the pupil to 1.9 *mm* while the spherical protruding surface of the vitreous retains its radius of curvature 1.3 *mm*, the diameter of the diffusion circles on

the retina will be reduced to 0.06 *mm*, but this is still too great to allow an acuteness of vision of 0.5.

In order to gain vision of 0.5, which Walter's patient possessed, other conditions remaining the same, the pupil could be at most only 1.5 *mm* wide. The conditions would be much less favorable, as Walter himself recognized, if the smaller figure representing difference in refractive index between vitreous and aqueous were taken.

The difficulty is done away with, however, if one gives up the view that the anterior surface of the vitreous is spherical. If one undertakes the problem of determining the form of surface that would lead to an accurate focusing of the refracted rays upon the retina, it is found that it will be a surface of revolution whose meridian curve would be represented by an equation of the fourth degree between the right-angled coördinates. The portion of this surface lying in the pupil would correspond sufficiently accurately to an ordinary paraboloid of rotation. The central portion of this would have, of course, the same radius of curvature as Walter's computed hemisphere. Here we have the advantage that, first, the relation of pupillary width to radius of curvature is eliminated, and second, with the slight difference between the two refractive exponents concerned a possible form of boundary surface will result. To discuss more in detail the form of this surface seems now useless, since it must first be determined whether it is anatomically possible for the action of the ciliary muscle to produce such a surface, and, furthermore, the refractive index of the vitreous must be more accurately determined. I will only say that forms will be obtained similar to those ascribed to the accommodating lens by the adherents of the Young-Tscherning theory.

If Walter believes that the amount of the salt component of the vitreous must considerably affect its refractive index, I would call his attention to Bömer's statement, that a one-per-cent. salt solution has a refractive index only 0.00146 higher than that of distilled water. Therefore the difference in the amount of salt present in different persons could alter the refractive index no more than ±0.00015.

AMAUROTIC FAMILY IDIOCY.

By Dr. MICHAEL MOHR,

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Abridged Translation by Dr. WARD A. HOLDEN.

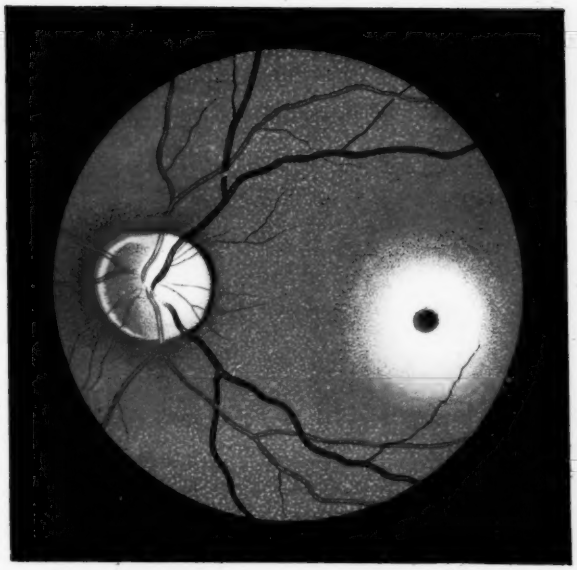
(*With an ophthalmoscopic drawing on Plate XXIV. of Vol. XLI., German Edition, and three figures on Plate XXV.*)

THE matter which I intend to discuss is not new. English and American authors saw cases of this sort as long ago as 1881, and continental oculists saw such patients now and then, but they were unable to explain the disease until Sachs, having observed several patients himself, collected the reported cases, and gave the disease its current name.

It is proposed to give a *résumé* of the papers already published, and then to present my own case, which was examined both clinically and pathologically.

1. Waren Tay's cases,[1] three in one family. The eldest child, a boy, was seen by Tay at the age of twelve months. At that time the discs appeared normal, but in the macular region was a broad whitish, nearly circular patch, with a sharply outlined brownish-red spot in the centre, forming a marked contrast to the whitish patch about it. This central spot does not resemble a hemorrhage or a collection of pigment, but looks like a perforation punched out of the whitish patch, through which one sees normal tissues. In fact, the picture is similar to that which we see in cases of embolism of the central artery. The infant had been growing weaker for some months before it was first seen, but there were no paralyses. Four months later the infant was unable to move. The patch at the macula remained as before, and the optic

Plates XXIV. and XXV. of Vol. XLI., German Edition, illustrating Dr. Michael Mohr's article on *Amaurotic Family Idiocy*, will be sent to subscribers as soon as received from Germany.



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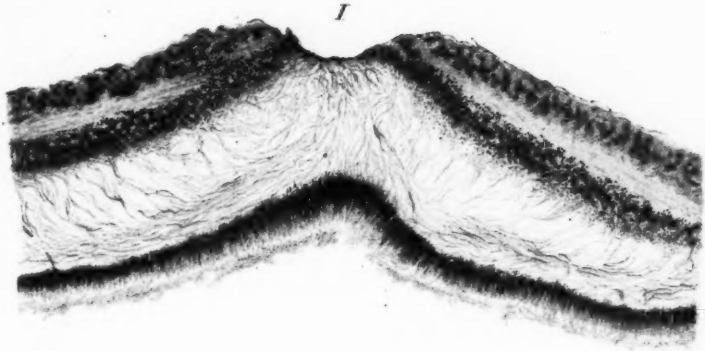

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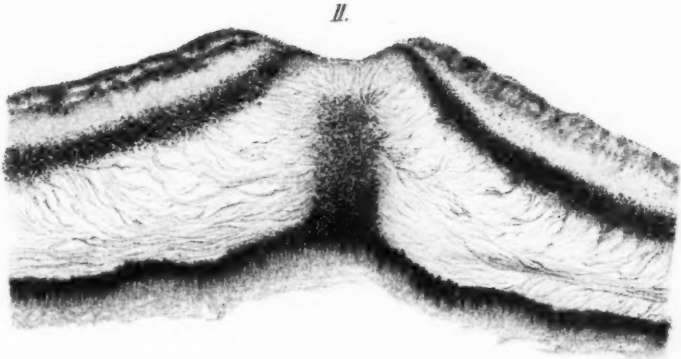

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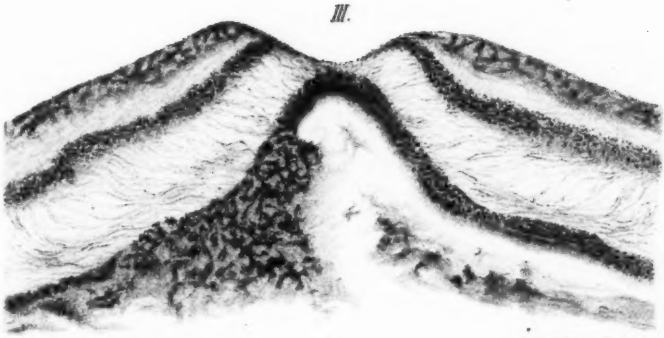

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discs began to shrink. At the age of twenty months the infant died.

2. The second of Tay's cases[3] was also in a boy, seen when several months old. The condition of the eyes was similar to that in the first patient. Neither as regards muscles nor nervous system could any abnormality be discovered, but in the sixth month the patient began to grow weak, and at the age of eighteen months it was brought to the hospital. It had convulsions. One day there were well-marked epileptiform spasms, the right half of the body was rigid, and the eyes deviated to the right. Two other attacks were observed. The optic discs were pale, and the macular regions were altered as in the first case. The weakness increased, and the infant died twenty-four days after admission.

3. Tay's third case[3] was in a boy seen some weeks after birth. There was optic neuritis, but no general weakness. In the sixth month the changes in the macular region were fully developed, and the discs had become pale. The patient was not followed later, but was thought to have died like the others.

4. Magnus.[4] A girl of eighteen months, the first child of healthy parents, is unable to walk or even to sit up without support, or to hold up her head. The musculature is very weak. The head is of normal size, the fontanelles not yet fully closed. Hearing is normal, and the appetite good. The child has never suffered from convulsions, but it now has laryngismus stridulus, and is excessively nervous. It cannot be made to fix ; the eyes are divergent and staring. The urine is free from albumen.

The color of the iris is dark gray, the pupils are of normal width, but react sluggishly. There is no limitation of mobility. The optic discs are quite pale, though rather yellowish than white. The temporal half is the paler. The vascular system of the retina is, both in calibre and in color, altogether normal. The fundus is of a fairly light red color, with the choroidal vessels easily distinguishable, the patient having light blond hair. The region of the macula lutea is of a pronounced milky-white color, and at the macula is seen the well-known cherry-red spot. The choroidal vessels are completely veiled by the whitish patch. Some small retinal vessels are readily distinguishable on the white patch. The changes are alike in the two eyes. When seen four months later the fundus appearance was the same.

5. Goldzieher[5] demonstrated to the Medical Society of Budapest "a peculiar ophthalmoscopic picture in an infant." Media

clear. Complete blindness. At the macula a patch two disc-diameters wide, of metallic lustre, with a red spot at its centre as large as a cherry-stone. Optic nerves atrophic. The rhachitic, poorly nourished infant had eclampsia at the age of six months. Hearing poor. The parents had not had syphilis, but there had been four miscarriages before the birth of this infant.

6. Knapp[6] saw his patient in January, 1885. It was two to three months old, well nourished, but weak in muscle, and sluggish. The fontanelle was large and at times prominent. Vibratory nystagmus in both eyes. Form, position, and tension of the eyes normal; pupils narrow and reacting sluggishly to light. Media clear, optic discs pale. The cherry-red fovea centralis was surrounded by an intense grayish-white opacity, whose radial breadth was about two-thirds p. d. The opacity was densest and most cleanly cut at the fovea, remained uniform in the adjoining two-thirds, and then gradually faded out in the periphery.

Knapp had seen similar cases previously. In some cases there had been a congenital inflammatory affection of the optic nerves, with blindness existing or coming on later. In one case the picture was uncomplicated. This patient appeared in his clinic, and Dr. Born called his attention to the condition.

The infant [6] was treated with calomel, massage, and later with iodide of potassium. It had a good nurse and was sent to the country in the spring and to the seashore in the summer. Its body developed slowly and the infant became stronger and less indifferent, but at times has trismus. Digestion and urine were normal. During the eight months that the infant was under observation the circumfoveal patch remained unchanged. In April the vision improved, while the nystagmus, which had increased in February and March, diminished, and objects were followed by the eyes. In the beginning of August the nystagmus had quite disappeared and binocular central fixation existed. The pupils were normal as regards size and mobility.

According to the original report the infant recovered, but Kingdon[7] and Frost[8] cited the case as having ended fatally when the infant was two years old. According to the latter account, only the brain was examined and changes were found in the large and small pyramidal cells of the cortex,

as well as atrophy of the convolutions from defective development.

7 and 8. Two cases reported by Wadsworth.[10] In February, 1887, he saw a girl of eleven months, of Hebrew parentage, apparently well nourished, but unable to sit up or hold the head erect. Musculature so soft and thin that the spinal column could easily be felt. The head was well formed and the infant's facial expression was rational although indifferent. The infant never cried. Bowels sluggish, heart normal, knee-jerks present. The eyes were normal externally, and had normal mobility; the pupils were dilated, but responded promptly; vision poor. The discs were slightly grayish, the vessels normal. The centre of the macular region was dark red, surrounded by a whitish zone in which fine retinal vessels could be followed. This area was about 1½ p. d. in diameter. The remainder of the fundus was normal. The condition was alike in the two eyes. The infant began to grow emaciated and to have spasms. The discs became gray, while the patches at the macula remained as before. The mother stated that this was her sixth child. The first four were strong and healthy. The fifth, born three years before, showed symptoms similar to those of the patient and died at the age of eighteen months. The father was healthy.

9. Sachs's case.[11, 35] A girl seen at the age of three months. Knapp found vibratory nystagmus, and small pupils as is usual in infants of this age, transparent media, pale discs, and both foveæ cherry-red and surrounded by an intense grayish-white opacity. Knapp believed that there was failure of development. Finally complete atrophy of the optic nerves came on.

10. Hirschberg's case.[12] An infant of ten months, first-born (sex not stated), with failing vision. The infant was of a weak constitution, yet no internal disease could be discovered, apart from rhachitis and idiocy. There was no history of syphilis. The eyes appeared to follow the light and the pupils reacted. About a red spot at the fovea was seen a bluish-gray zone ¾ *mm* broad which grew paler toward the periphery. Optic discs normal. Small pathological foci in the periphery of the fundus. Calomel was prescribed. Eight months later the infant was pale and ill and appeared to be almost blind. Fundi as before.

11 and 12. Tay's fourth and fifth cases.[13] An eleven-months-old infant. Lies helpless in its mother's arms and cannot raise its head. Typical changes at the macula in both eyes. Discs slightly

gray. Vision apparently not reduced. The infant was the sixth and youngest of the family. The oldest child, a boy, exhibited the same symptoms and died at the age of fifteen months. Four other children are healthy.

13 and 14. Kingdon.[14] The first of these was not seen by Kingdon personally. A first-born son, well developed at birth, gradually grew weak in the back and limbs. It became apathetic and blind and died in the second year. The second child of this family, born five years later, was healthy at the age of five years and a half. Kingdon's second case was in an infant of eight months, the third child of Hebrew parents, which was brought to the children's hospital at Nottingham on account of weakness of the back and limbs. It was healthy at birth, but began to grow weak at the third month. It was fairly well developed, with a considerable amount of fat, but soft muscles. It lay quiet, cried rarely, and frequently laughed without any particular reason. The skin when irritated became red, but otherwise there was but slight reaction to irritation or pain. The infant did not reach out for objects, and when objects were put into its hands it held them loosely. The back and limbs were very weak, the knee-jerks present. Thoracic and abdominal organs normal, eye muscles normal. For three weeks it had not appeared to notice objects. Pupils equal and responsive, media clear, optic discs pale, yellowish-white, retinal vessels reduced $\frac{1}{3}$ in calibre, neither hemorrhages nor tortuousness of the veins. In the region of the macula a grayish-white patch, twice as broad as the optic disc, oval in shape and indistinct in outline, with some retinal vessels in its periphery. In the middle of the patch is a dark cherry-red spot resembling that seen after embolism of the central artery. No other changes in the fundus. The infant gradually became weaker and died.

Autopsy (eighteen hours after death). — Posterior fontanelles closed, anterior nearly closed. Dura mater in the line of the superior longitudinal sinus fast adherent to the skull. Little cerebro-spinal fluid. Over the entire surface of the brain the sulci are widened. Arachnoid and pia mater not thickened, and readily detached. No meningitis. After hardening, the brain was examined, but nothing was found in the primary fissures and gyri. Various sections were studied, in which it appeared that the various layers of

ganglion cells could not be differentiated as readily as under normal conditions. The large pyramidal cells were almost without exception round or oval. The cell substance did not stain well with methylin blue, hematoxylin-eosin, or acid fuchsin. The protoplasm had lost its granular appearance, and a broad free zone was left about the nucleus. In the small pyramidal cells a similar change was found. Deiter's cells were increased in number, but it is questionable whether these were not altered pyramidal cells. The spinal cord was degenerated down to the second or third dorsal vertebra.

The eyes were examined by Treacher Collins. "It is extremely difficult to prepare microscopic sections of the macular region, and unfortunately a fold had formed in this region in both eyes." One eye was cut in celloidin. The retina, choroid, and sclerotic of the other eye were imbedded separately in paraffin and cut with a rocking microtome. The choroid was absolutely normal. The only abnormality found was a spacing out of the outer molecular layer as though there had been some localized œdema in this region. The other retinal elements appeared to be normal.

15. Sachs[15] in 1892 saw the development of the disease in a sister of the patient described as the ninth case.

16. Carter's[16] patient was a girl of nineteen months, second-born. The elder infant had died at the age of seven months in convulsions. There was some consanguinity of the parents. The infant had been well up to the third month, when it began to be weak, although there was no paralysis. It cannot sit up or hold the head erect. It moves its limbs slowly. The muscles of the neck and extremities twitch from time to time. Pupils responsive. The eyes do not follow the light. Macular changes as in the preceding cases. Six weeks later the optic discs pale and atrophic.

The patient died two weeks after the last examination and an autopsy could not be obtained.

17. Kingdon's third case[16] came from the same family as his first and second. It was the fifth child of the family, a girl. (The fourth, a boy, was quite healthy at the age of two years.)

At the third month the muscles had begun to grow weak but the eyes were normal. In the fifth month a suspicious cloudiness

appeared in the macular regions, and in the ninth month the typical changes had developed. The child died.

Both eyes were examined by Treacher Collins as reported in Frost's atlas.[9] The optic nerves were atrophic. The proliferation of fibrous tissue among the nerve fibres and the increase in the number of round cells were remarkable. The cupping of the disc was due to the atrophy of the nerve fibres. No inflammatory exudation could be found in the intervaginal space. The central artery was full of blood, the vein empty; no changes in the vessel walls. The choroidal vessels corresponding to the macular region were dilated but presented no changes or evidences of inflammation. The retina in this region was thrown up into a fold and detached from the choroid. The retina here was markedly thickened in consequence of enlargement of the outer molecular layer, which presented cavities here and there evidently due to œdema. So far as could be discovered the other layers of the retina were normal, and save at the macula the retina seemed to be healthy.

18, 19, 20, and 21. Kingdon and Risien Russell [10] observed four cases in children of Hebrew parentage; there had been three other children, one having died of the same disease and the other two being healthy.

The eyes were examined by Treacher Collins. The retina in the macular region was greatly thickened through hypertrophy of the outer molecular layer. This change was most marked near the fovea. Optic nerves atrophic, with proliferation of interstitial tissue. No inflammatory exudation.

In the central nervous system the changes were: extensive degeneration of the pyramidal cells, extensive degeneration in the fibres of the corona, the pyramidal tracts, and down through the pons, medulla, and cord.

22. Heimann's [11] case was that of a first-born girl of fourteen months who could neither walk nor stand erect. Strouse examined the eyes and reported a yellowish-white patch at the macula, $1\frac{1}{2}$ p. d. in diameter, with a cherry-red spot in the centre. The optic disc exhibited signs of incipient atrophy.

It is noteworthy that this child was healthy up to the sixth month, and then became idiotic and began to lose its sight. The large fontanelle open; slight paralysis of the entire body; reflexes increased; ankle clonus.

23, 24, and 25. Higier's [19] cases, of Hebrew parentage; no consanguinity. The mother had borne five children and was in good health during her pregnancies and the infants were born at term. The infant observed was the youngest. Of the other four two died of the same disease, one died of summer diarrhœa, and one is still living and five years old.

26, 27. Koplik's [20] cases. The first case was in a boy eleven months old, weighing fifteen and a half pounds. The mother, a Russian, was nervous. She had borne five children, all healthy. This infant had always been weak, and was bottle-fed. Five months before it had fallen and since then had grown weaker.

Dr. Cowan found the characteristic fundus picture. The infant was not quite blind.

The second case was in a girl a year and a half old, weighing seventeen pounds. The mother was a Russian, nervous, and had borne eight children, four of whom had died, but none with symptoms like the patient's. Father healthy. After the fifth month the infant became weak and stupid.

Dr. Cowan found the characteristic fundus picture.

28. Peterson's case.[21] The patient was seen at the age of three months, and died in the eighth month of life. The brain appeared undeveloped, both macroscopically and microscopically. The nerve cells in the cortex and in the medulla were few in number and poorly developed, particularly in the region of the calcarine fissure, in the temporo-sphenoidal lobe, in the frontal lobe, in the motor zone, in the corpora quadrigemina and the corpora geniculata, and in the nuclei of the third and fourth.

No demonstrable changes in the fibres were found, nor imperfect development of the optic tracts.

29. Jacobi's case.[22] A girl, one year old, of Hebrew parentage. Typical fundus picture with atrophy of the optic nerves.

30, 31, 32, 33. Koller's cases.[27]

34. Strause's case,[23] cited by Sachs.

35, 36, 37. Hirsch's cases.[28] One patient was a boy, seen at the age of ten months, of healthy Hebrew parentage. The others were described by the mother as being affected in a similar way,

and dying respectively at the ages of eighteen and twenty months.

This patient seemed healthy up to six months of age, and then began to grow weak, so that it could not sit up or hold the head erect. There was perception of light and hyperacusis. Reflexes present, internal organs normal. The child grew weaker and died at the age of twenty-one months. Autopsy four hours after death. Macroscopic changes in the brain were not found. The fissures were normal, except that the second temporal fissure was abnormally long. There was degeneration of the pyramidal cells and also of the ganglion cells in the cord. The cells were swollen, the nuclei excentric, the processes and axis-cylinders diminished in size and broken down. The degeneration was complete in the cerebrum, cerebellum, optic tract, and chiasm. The blood-vessels and neuroglia were normal.

Hirsch considered the changes to be the result of some intoxication.

38, 39, 40, 41. Sachs's [33, 34] cases, all in one family.

Our case is, therefore, the forty-second to be reported, the seventh examined pathologically, and the fourth in which the eyes were examined with a microscope.

The disease is characteristic. The child is healthy at birth, and for the first weeks, or even months, of its life.

After from two to eight months the parents notice that the infant is becoming apathetic, takes little notice of its surroundings, rolls the eyes about (sometimes there is nystagmus), and becomes weak, so that it cannot hold its head erect. It does not fix, and when examined with the ophthalmoscope the characteristic change is found at the macula. The weakness of the extremities increases, and the legs become more or less paralyzed. This paralysis is sometimes spastic, sometimes flaccid. In some cases there are no convulsions, in others these are severe, epileptiform, and sometimes increase until opisthotonus is brought about. The reflexes may be increased, normal, or decreased. Koplik, in one case, found a diminished reaction to the faradic current. The infant remains backward in psychical development, and toward the end of the first year complete idiocy develops.

At about this time the infant becomes blind quickly and dies, usually before the end of the second year of life.

According to Sachs, the chief symptoms are: 1. Mental deficiency, noticeably in the early months of life, leading to idiocy. 2. Weakness in all the limbs, resulting in complete paralysis, spastic or flaccid. 3. The deep reflexes may be normal, increased, or diminished. 4. Diminution of vision, leading to complete blindness (changes at the macula and later optic-nerve atrophy). 5. Marasmus and lethal ending, mostly before the end of the second year. 6. The disease affects several members of the same family.

Sachs reports the pathological findings in two cases, Kingdon [14] in one, Kingdon and Russell [17] in one, Peterson [21] in one, and Hirsch [18] in one.

In Sachs's case the fissures of the brain were very well marked, and showed many peculiarities as regards course, such as one finds in brains at a low stage of development (confluence of the fissure of Rolando with the fissure of Sylvius, exposure of the island of Reil). The chief microscopic changes were in the large pyramidal cells. In many hundred sections only a few pyramidal cells with normal structures were found. Most of the cells were changed into a formless mass, the protoplasm degenerated, the nucleus and nucleolus in part altered, the nucleus often lying in the periphery of the cell. In Weigert preparations the number of fibres was seen to be reduced. The blood-vessels were normal and no signs of inflammation were discovered. In Sachs's second case the ganglia, the chiasm, pons, and medulla appeared normal. In the lateral tracts a degeneration could be followed down to the lumbar region. In the anterior tracts no changes were found. The retinas were not examined.

Kingdon found similar changes in the cortical cell. In the case reported jointly with Russell extensive degeneration was found in the fibres of the corona radiata and in the pyramidal tracts in their entire length, as well as in the fifth-nerve bundle and in the upper cerebellar peduncle. The changes were symmetrical on the two sides.

Peterson found, as stated above, defective development of the nerve cells.

Hirsch[35, 36] found changes in the ganglion cells of the brain and cord without any œdema.

Sachs believed that the abnormally small number of pyramidal cells indicated a defective development of the brain, and that this was primary.

Kingdon considers the changes in the cord secondary, but Sachs regards them as due to defective development.

The etiology is unknown, but the family character of the disease is pronounced. Most of the infants affected have been of Eastern Hebrew parentage.[1]

My own patient was first presented to the Royal Society of Physicians at Budapest as one of "œdema maculæ lutæ symmetricum." Prof. Goldzieher characterized it as amaurotic family idiocy, and such it proved to be.

G. Z., an illegitimate son of a Hebrew laboring woman, was admitted to the hospital May 26, 1898, aged a year and a half. The present disease began six months ago, before which time the in-

[1] The author here makes some citations from the translator's paper[39] which are rather garbled, and he therefore takes the liberty of stating his present views in his own words. The eyes of Dr. Peterson's patient and of Dr. Hirsch's patient were examined by me. No changes were found in the retina of Dr. Peterson's patient except post-mortem ones; and this case was probably one of idiocy with cortical blindness, a brother of the patient five years old being a blind idiot with weak muscles whose fundus I found normal and his pupils responsive, although the case had been reported a year before as one of amaurotic family idiocy.

Comparison of four such cases with a larger number of cases of typical amaurotic family idiocy has led me to believe that the former cases are not very rare, and that they may present the idiocy and the muscular weakness of the other cases, but that the patients *are blind from birth and have normal fundi*. These facts alone render the designation "amaurotic idiocy" unsatisfactory.

In Dr. Hirsch's patient the grayish patch was observed in life and could still be seen after the eyes were divided.

The retina usually becomes detached at the macula after death, and its elements are spaced out so that a deceptive appearance of œdema is presented.

Comparison with a number of other eyes seemed to prove that there had been no œdema in life in the eyes of this patient with amaurotic family idiocy.

All the ganglion cells of the retina were found to be enlarged and chemically altered so that they gave distinctive staining reactions like the altered ganglion cells of the central nervous system. In the normal eye the ganglion-cell layer is from 8–12 cells deep at the margins of the fovea; at a disc diameter from the fovea laterally, and a shorter distance above and below, it is but 3–4 cells deep, while farther from the fovea it rapidly thins down to a single stratum of cells. The oval grayish patch at the macula occupies exactly that region in which the ganglion-cell layer is four or more cells deep. The gray is densest just about the fovea where the ganglion-cell layer is thickest, and fades away into the normal-colored fundus where the ganglion-cell layer thins down. The simple atrophy of the optic nerve is doubtless consecutive to the degeneration of the retinal ganglion cells.—W. A. H.

fant could sit up and eat with its own hands. Since then it has become emaciated and idiotic.

The infant is poorly developed and poorly nourished, with manifest signs of rhachitis. The cranium is flattened from before backward, and the forehead is very low.

Both pupils medium-sized and sluggishly responsive to light. At the macula is a bluish-white patch 1½ p. d. wide, which passes over into the normal fundus without a sharp line of demarcation. At its centre is a dark cherry-red spot ⅓ p. d. in diameter. The disc is slightly pale and the vessels a little contracted (see Plate XXIV.).

The infant swallows with great difficulty and its food regurgitates through the mouth. Marked salivation. Thoracic and abdominal organs normal. When lying quiet the infant keeps both its wrists and elbows flexed, and it requires some effort to bring the arms to the normal position. The legs are fully extended, the feet having the pes-equinus position. A certain effort is required to bend the legs also. This spasm is equal in the two legs, but is more marked in the right arm than in the left. For a few minutes at a time the spastic condition relaxes. The infant cannot sit up, and when raised the head falls forward. All reflexes greatly increased. Hyperacusis. No fever. Poor appetite. Constipation.

Swallowing became more difficult. Constipation continued. The spasms increased. The pulse became fast and weak. There was at intervals some increase in temperature. Death occurred on July 14th.

Both eyes were enucleated at once.

The autopsy was made by Prof. Hugo Preisz July 16th. The brain was of medium size, the convolutions small, and the sulci wide and deep. The pia mater congested and serous in the frontal and parietal regions. The frontal and parietal portions of the cerebral cortex, and particularly the entire cerebellum, the ganglia, both optic thalami, and the centrum ovale in the portions near the fornix were of almost cartilaginous hardness. The cranium was thin. The sagittal and coronal sutures were not ossified, but were only indicated by a fine line. The spinal cord appeared somewhat condensed; in the lower dorsal portion the white substance of the lateral and medial tracts was somewhat

grayish and translucent. In the other organs, apart from the great emaciation, the anæmia, and the small size of the stomach, there was no pathological change.

Sclerosis congenitalis præcipue cerebelli, thalami optici, nucleorum cerebri utriusque et corticis præcipue lobi frontalis et parietalis.

Histological description of the brain (*Professor Schaffer*).—All the preparations, which were taken from all parts of the left hemisphere, showed an extraordinary diminution in fibres. The fibres of the corona radiata were remarkably disturbed. Weigert preparations stained pale gray instead of the usual black. In the cortex the radial layer was barely indicated. The supraradial layer was almost wholly without fibres, the tangential layer was represented only by one or two poorly formed fibres. The deep pyramidal cells and the polygonal cortical-cell layer exhibited fatty granular degeneration at the margins of the anterior and posterior central convolutions.

The region of the mid-brain: Conditions normal, except that the peduncle is very poor in fibres, so that the medial and lateral thirds are almost free from medullary substance, while the medullary substance is reduced in the central third.

Medulla: The pyramidal tracts lack medullary substance and the formatio reticularis lateralis is poorer in fibres than in its natural state.

Cord: The anterior columns are normal to the end. In the cervical and dorsal portions the cerebellar tract of the lateral column was normal while the other portions showed a diffuse degeneration of the fibres. In the lumbar and sacral portions of the cord the affection of the lateral columns was limited mostly to the pyramidal tracts. The posterior columns here were intact, Clark's column also, which corresponds to the fact that the cerebellar tracts were in the same condition. In the middle and upper portions of the dorsal cord there was a lack of fibres in the posterior columns which farther up in the cord affected only the column of Goll but in this column could be traced up to the nuclei.

Hematoxylin-eosin preparations of the cortical motor areas showed a great increase of glia tissue. The nerve cells were degenerated, the blood-vessels normal.

DESCRIPTION OF THE RETINA.

The eyes were enucleated immediately after death. The right was put into Flemming's solution, the left into alcohol for the Nissl stain, but the latter shrank up and could not be used for microscopic examination. The right eye was left in Flemming's solution for two days, then washed in water, and hardened in alcohols of increasing strength. Celloidin imbedding. Staining with safranin-picric acid and hematoxylin-eosin.

In the periphery the retina appeared normal. The macular region was elevated and nearly doubled in diameter. The ganglion-cell layer was thickened and near the fovea ten to twelve cells deep. The other layers were normal except Henle's fibrous layer, which was much widened in the region of the macula. It should not be forgotten that the fibres of Henle's layer may be artificially displaced in the normal retina, but when the changes were so marked as in this case, they must be considered pathological.

At the margin of the fovea centralis the internal molecular layer of bipolar cells forms a thin stripe, and next to it lies the broad layer of cone fibres (Henle's layer), Fig. 1, Plate XXV. The external molecular layer near the fovea is thickened and projects like a papilla almost beneath the floor of the fovea, Fig. 2. At this point Henle's layer is not visible. In some sections (Fig. 3), which apparently lie in the middle of the macula, the entire outer molecular and cone layers appear displaced toward the floor of the fovea. The spaces left in Henle's layer and that between the rod-and-cone layer and the choroid, where the macular region is detached, are all filled with a granular substance staining yellow with picric acid.

The cavities in Henle's layer (Fig. 1) are, in my opinion, an undoubted sign of œdema.

Both clinically and pathologically this case is seen to have been a typical one of amaurotic family idiocy. It is quite out of the question that this brain could have been abnormally developed in the beginning.

The positive result of the examination of the retina was the determination of the existence of œdema, chiefly localized,

at the macula, and destroying sight by softening the visual cells. The atrophy of the optic nerves appearing later is a secondary (perhaps descending) process.

It is evident that the condition of the macula, although it resembles the condition following embolism of the central artery, is not identical with it. I incline to the opinion that there is an angeoneurotic œdema. Frequent spasm of the vessels, even if not excessive, must leave its traces in the macular region, which has no vessels of its own. The existence of such spasm and its connection with the underlying disease are hard to prove, yet the fact that they constantly are found together indicates that the connection is a close and causal one. The following explanation may perhaps be satisfactory: The central artery of the retina, as a branch of the ophthalmic artery, arises from the internal carotid. The vaso-constrictors of the cephalic blood-vessels arise from the lower portion of the cervical cord, and passing upward unite with various nerves—those fibres intended for the eye, for example, with the trigeminus. I conceive that the pathological process which causes this angeospasm lies in the lower portion of the cervical cord, and pathological examination has shown that there are changes in the cord and medulla.

The conclusions at which I have arrived from a study of my own case and a consideration of the literature are as follows:

1. Amaurotic family idiocy is a well-defined, independent disease.

2. Chief symptoms: the infant is born normal and develops for some months or a year without any physical or mental disturbance; then it loses strength; the back and the extremities become weak; paralyses appear, sometimes spastic, sometimes flaccid; the reflexes may be normal, diminished, or increased. Vision is lost; in both eyes the typical white patch appears at the macula, with the cherry-red spot in its centre on which the diagnosis rests. Later the discs become atrophic. The strength continues to fail and the infant usually dies before the end of the second year of life. Usually several members of a family are attacked.

3. Anatomical changes: a great destruction of fibres in

the brain, medulla, and cord, particularly in the pyramidal tracts. An absence or rudimentary presence of the pyramidal cells, at some points fatty degeneration, hypertrophy of the neuroglia.

In the eye: œdema of the macula lutea, increase in the ganglion-cell layer, atrophy of the optic nerve.

My thanks are due to Professor Tangl, in whose institute I carried out my investigations, and to Dr. Vermes, who made the drawings for this paper.

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CONGENITAL DOUBLE PARALYSIS OF THE ABDUCENS AND FACIAL NERVES.

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HITHERTO the literature on this subject has been confined to the reports of five cases, which are in brief as follows:

I. Harlan, in the *Transactions of the American Ophthalmological Society for 1881*, under the title "Congenital Paralysis of both Abducens and both Facial Nerves," described the first case. The patient was a man eighteen years old. Both eyes were directed inward and a little upward. All the ocular muscles, except the paralyzed externi, possessed normal motility. There was complete paralysis of the muscles on each side of the face, the eyelids could not be closed, and there was epiphora. In other respects the patient was perfectly well.

II. In 1882 Julian J. Chisolm reported in the Archives of Ophthalmology a case in which a woman thirty-five years old had since birth had paralysis of the externi and of the muscles of the face. In very early childhood a myotomy had been performed on each internus to correct a marked convergence. No trace of strabismus remained, the movements of the eye upward and downward were good, but lateral movements were impossible. The skin of the face was smooth, and the only action of the facial muscles was to produce a few wrinkles below the angles of the mouth and on the lower lip.

[1] From Prof. Fuchs's clinic in Vienna.

III. In Graefe and Saemisch's *Handbuch der Augenheilkunde*, vol. vi., Graefe described another case. The patient was a man, twenty years of age. The paralysis was more marked on the left than on the right side of the face. Adduction was impossible on account of the paralysis of the abducens, but there was no strabismus. The movements of convergence associated with accommodation were performed with ease, but the interni could turn the eyes laterally only to an incomplete degree and with great difficulty. This condition had existed without change since the birth of the patient. Aside from itching of the hands and slight epileptiform attacks he was in other respects well.

IV. In 1888 Moebius contributed this case in the *Muenchener medicinische Wochenschrift*. A man fifty years of age came to the clinic in Leipsic on account of a paralysis of the extensors of both forearms, attributed to blood-poisoning. The first joints of his second and third fingers were united by a web. There was a paralysis of the muscles on both sides of the face, except at the angle of the mouth and the chin, and both external recti were paralyzed. The eyeballs were in proper position, though in looking downward there was a slight convergence. Whenever an attempt was made to turn the eyes laterally the externus of the one eye absolutely refused to work, while the internus of the other eye made with difficulty a slight motion toward the nose. When such an attempt was made very energetically the eyes converged and the patient fixed with the right eye in the attempt to look to the left and with the left eye in trying to see to the right. The same result was obtained when one eye was closed. Epiphora was present. The paralytic condition had existed since birth.

V. Schapringer reported in the *New-Yorker medicinische Monatsschrift* another case of what he called "congenital bilateral pleuroplegia." The patient was a girl eight years old, who had complete bilateral facial paralysis, except that the right angle of the mouth could be drawn downward and outward. When fixed for distance the axes of the eyes were parallel, though at times the right eye turned upward and a little outward. The movements of the eyes upward

and downward were good, but lateral movements could not be performed either with both eyes open or with one eye closed. Convergence was not interfered with. The patient had astigmatism, bilateral epicanthus, a bifid uvula, a strongly developed canine ligament, and a congenitally crooked left forefinger.

Lately I observed the following case in Prof. Fuchs's clinic, to whom I am indebted for the opportunity to add it to the foregoing:

VI. The patient was a girl seven and one half years old, the third child of her parents, born in the seventh month of gestation, an accident ascribed by her mother to a great amount of trouble she had to endure during pregnancy. The labor was without artificial aid. The malformations were present at birth and had never changed. Patient had had whooping-cough and measles, but never had had convulsions. Parents alive, healthy, not nearly related. Four brothers and sisters, all alive and not malformed.

The child was pale, rather slender, of the usual size for her age. The bones of her skull were rhachitic, the legs were slightly bowed and there was a slight dorsal scoliosis to the right. There was epicanthus on each side, more marked on the left, where it covered the lower punctum lachrymale, and epiphora of the left eye. Each abducens was paralyzed, while the other ocular muscles performed their functions properly. Gentle closure of the lids was incomplete, leaving a space 1.5 *mm* wide between them on the right side and 2 *mm* on the left, while firm closure was complete on the right side, but left a space 1.5 *mm* wide between the lids on the left. Both sides of the face were expressionless, as there were no wrinkles except the right naso-labial fold. The left side of the face was flatter and broader than the right. The bridge and tip of the nose were in the median line, but the bridge was flat and broad, the left half more markedly so, and the left nostril was smaller than the other. The distance between the inner canthi was greater than usual, and that from the inner canthus to the median line greater on the left side than on the right. The right angle of the mouth was drawn outward, while near the left angle the lower lip

was thick, puffy, and presented a delicate vertical fold from the stretching of the skin.

The teeth were very irregular, widely separated, ridged and carious, the left upper molars were absent, and the lower jaw was displaced to the right. The action of the temporal and masseter muscles was good. The tongue moved freely in all directions, deviated to the right when extended, and its left half appeared to be the smaller. The senses of taste, smell, and hearing were normal.

The electrical reaction was abolished in all the muscles of the face with the exception of those about the right angle of the mouth and chin, together with the right levator alæ nasi.

Both eyes converged; the left also turned upward. Movements in the vertical meridian were performed well by both eyes. Abduction was of course completely absent. When the patient attempted to look at an object placed at her right side without turning her head, the left eye turned still farther inward and upward and then returned to its former position, but if the object was placed at her left side the right eye turned readily inward and, at the same time, slightly upward. The results were the same when the tests were made with one eye covered, except that the action of the left internus was rather more energetic. These tests were made many times, and the observations, which were made very carefully, seem to show that this action of the interni was not that of convergence, as in Moebius's case, but rather that of the associated movements of the eye.

Nothing abnormal could be seen in the eyeballs or in the fundus, aside from a scleral ring in the right and a crescent on the temporal side of the left nerve. In both eyes there were astigmatism with the rule and a slight degree of hypermetropia. Some improvement was obtained in the vision by means of a + 1 D spherical lens, but no more by means of cylindrical lenses. Lachrymation was free from both eyes in weeping as well as from reflex irritation.

The diagnosis, then, in this case was facial paralysis, complete on the left, incomplete on the right side, associated with a complete paralysis of the abducens of each eye.

The first problem to be solved is whether this condition was congenital. It is difficult to detect the presence of paralysis of the abducens at birth, because the infant is apt to keep its eyes closed, so when the paralysis is detected at a later period its development during the first months of life should be excluded. This paralysis might be produced by external injuries received during labor, either through direct pressure, or through the formation of hæmatoma involving the nerves, as in the case in which Seeligmueller observed a bilateral facial paralysis which had been caused by the pressure of the forceps, but usually such a traumatic paralysis is unilateral, unsymmetrical, and disappears after the lapse of a few weeks. In the case here reported labor was quite normal, and no support could be found for the idea that the paralysis developed at a later period on account of some hereditary disease. The mother asserted positively that the condition was noticed immediately after birth, and that it had remained unchanged ever since. Although the presence of this condition was in no case irrefutably demonstrated immediately after birth, and therefore it is possible that the paralysis occurred in one case before, and in another after delivery, this circumstance does not militate against the assumption that in all it was congenital, for all of them presented symptoms which indicated a probability that the paralysis had resulted from causes which had developed during fœtal life. In all of them the two abducens muscles were completely paralyzed, while the facial paralysis was complete on both sides in Harlan's case alone; in the others some of the lowest branches of the nerve escaped. In most of the cases other slight abnormalities were to be found. Thus, in the case here reported, there was astigmatism and epicanthus; in Schapringer's, astigmatism, epicanthus, a cleft uvula, and a deformed finger; in Moebius's, webbed fingers, and in Graefe's there were disturbances of sensation and epileptiform seizures.

The axes of the eyes converged in the cases reported by Harlan, Chisolm, and myself, but were parallel in those of Graefe, Moebius, and Schapringer. It was demonstrated in Harlan's, Graefe's, and my own cases that the internal recti acted not only in convergence, but also to produce conjugate

lateral turning of the eyes, not indeed promptly in both, yet unequivocally. In Moebius's and Schapringer's cases this lateral turning of the eyes was impossible, and the interni responded only to the impulse to converge in accommodation. Chisolm's case cannot be taken into account in this respect, because a myotomy had been performed on both interni during early childhood and they had no motility.

These six cases may be divided into two groups: one to include those in which the eyes were directed forward, and the interni were unable to turn the eyes laterally, though able to act in accommodation; the other to include those in which the eyes converged and the interni were able to cause the eyes to perform the conjugate lateral movements as well as to act in accommodation. Graefe's case is the connecting link between these two groups, for in that the eyes when at rest had their axes parallel, and the interni were able to turn the eyes laterally, although, as Graefe says, with difficulty, and with all attempts premeditated. In the first group there was a paralysis of the lateral turners of the eye, in the second a paralysis of the abducens of the eye alone, in Graefe's case paralysis of the abducens with weakened interni. From this distinction may be deduced the differential localization of the lesions and the explanation of this diversity.

Foville and Fereol found that in diseases of the pons, in addition to other disturbances of innervation, the power of the muscles to turn the eyes laterally was destroyed, while the power of convergence remained good, whence Foville concluded that there is in the pons a common centre for the nerves which supply the externus of the same and the internus of the opposite side. Wernicke found in the left half of the pons a collection of tubercles which had destroyed the nuclei, and consequently had produced a degeneration of the abducens and facial nerves. Both eyes were turned to the right, and no movement of them to the left was possible. It may be deduced from these facts that the fibres of the oculomotorius which innervate the internus to produce the associated lateral motion of the eyes come from the abducens nucleus, perhaps in the following manner:

Nervous tracts under the control of the will extend from the cortex to the nucleus of the abducens of the opposite side, thence fibres pass to a part of the nucleus of the oculomotorius of the other side which innervates the internus. In addition to this there is a direct connection between the nucleus and the cortex which governs the movements of convergence.

If now there happens to be a lesion of these cerebral tracts between the cortex and the nucleus of the abducens, there will be an inability to turn the eyes voluntarily to the side, and yet there will be no peripheral degeneration; but if the nucleus of the abducens itself is involved, there will result a paralysis and degeneration of the abducens as well as an inability on the part of the externus supplied by it to abduct the eye. The rectus internus, on the other hand, will perform its functions of lateral motion well as long as the nerve fibres which pass near the nucleus of the abducens and control the conjugate lateral movements are not involved. If the focus of disease lies where the connecting fibres of the nucleus of the abducens pass to the nucleus of the oculomotorius on the opposite side, a central paralysis of the internus as regards lateral movements will result. This explains why in some cases there is simply a paralysis of the abducens, while in others there is also a paresis or paralysis of the internus as regards the production of the lateral movements of the eye. In one set of cases the lesion of the nervous elements is confined to the nucleus of the abducens; in the other it involves also the fibres which pass through the oculomotorius to the internus.

Duval and Laborde believe in the existence of a crossed relation of the oculomotorius to the nucleus of origin of the abducens on the opposite side through the fasciculus longitudinalis posterior—that is, that the nerve fibres leave the nucleus of the abducens at its cerebral pole and join the posterior longitudinal bundles. But farther on they appear to enter the tegmental region and, according to Nussbaum, to pass from the oculomotor nucleus to the other side in the commissura lemnisci, where, in its medial portion, the root fibres of the oculomotorius are to be met with. These are

the anatomical explanations for the physiologically concurrent action of the internus of one and the externus of the other eye, and they also indicate the seat of the lesion in such cases as these.

Diplopia was not present in any of the six cases because, as the paralytic condition of the abducens was congenital, the persons so afflicted either had never learned to see single with both eyes, or else they had learned at an early period to suppress one of the two images, and had then forgotten that they ever had had diplopia.

The paralysis of the abducens was associated in all six cases with paralysis of the facial nerve, either complete on both sides, or with the lower twigs exempted on one or both sides to a greater or less degree, and in the case here reported the right orbicularis also slightly retained its functional power.

One of the results of the facial paralysis in the sixth case appeared to be a faulty development of the bones of the left side of the face, similar to the atrophy observed in young rabbits from which the facial nerve has been extirpated. This was responsible for the epicanthus, and may also explain the distortion of the tongue and the non-apposition of the rows of teeth. The absence and caries of the teeth may perhaps be ascribed to the lodgment of particles of food, favored by the paralysis of the muscles of the cheeks. Further consequences of such a paralysis which may occur are the development of keratitis e lagophthalmo and of a paralytic ectropium.

Sometimes a double ophthalmoplegia externa is associated with a double facial paralysis, either limited to its upper branches[1] or involving the nerve completely.[2]

Experiments on animals and clinical observations render it probable that the fibres of the upper part of the facial, which supply the orbicularis and the frontal portion of the occipito-frontalis, spring from the posterior section of the

[1] Hanke, *Weiner klin. Wochenschrift*, xlvi., 1894.

[2] Such a case has been observed in this clinic. The patient was a woman, thirty-four years old. The paralysis was congenital, more marked on the right side. Meynert found it to be a peripheral paralysis of all the branches of the facial nerve on the distal side of the Fallopian canal. The abducens was intact, the hearing good.

nucleus of the oculomotorius of one side and pass thence to the knee of the facial nerve. Mendel found a degeneration in the posterior part of the nucleus of the oculomotorius in rabbits when the muscles supplied by the upper part of the facial had previously been destroyed. No changes, on the contrary, are to be found in this nucleus after the entire root of the oculomotorius has been torn out. The following case, recently observed in this clinic, may be quoted in support of this point: A man of eighteen had a congenital, isolated paralysis, to an almost equal degree on each side, of the twigs of the facial nerve which supply the orbicularis and the frontal portion of the occipito-frontalis, and in all other respects was in a normal condition.

The nucleus of the abducens lies in the bend of the knee of the facial nerve, which forms the eminentia teres in the floor of the fourth ventricle, so that it is in immediate contact with that nerve in its ascending, middle, and descending portions, and it is evident from these close anatomical relations that a lesion which affects the nucleus of the abducens is apt also to involve the adjoining facial nerve.

The next question which arises is whether the lesion is a primary one of the nervous elements, or of some other nature.

The muscles might be primarily defective. Primary atrophy of the muscles of the face belongs to the class of diseases called by Erb dystrophia musculorum progressiva; it has been observed in the extrinsic muscles of the eye and levator palpebræ superioris, and Fuchs has shown that it may affect the levator alone. At a very early stage a differentiation might perhaps be made with the microscope between a primary muscular atrophy and one of neurotic origin, but after the lapse of years, as in these cases, muscle, nerve, and nucleus are all involved in the degenerative atrophy, and the same changes will be found, no matter where the primary lesion was located. But it is not credible that a primary atrophy of the muscles should thus occur on each side of the face throughout the region of distribution of two cerebral nerves whose nuclei and intracerebral fibres lie so close to each other.

When it is also borne in mind that in many of these cases the interni work well in convergence but refuse to turn the eyes laterally, it seems evident that the lesion must be central, and that it must be situated in the nuclei. An indication that this lesion is a primary one of the nuclei of both these nerves with a descending atrophy, is the absence of all symptoms which such paralyses occasion when they result from diseases such as tumors, poliomyelitis, tabes, syphilis, acute infectious diseases, and alcoholism. In all such cases any doubt as to diagnosis would be cleared up by the development of the corresponding symptoms of the disease, while the effects of a primary lesion of both nuclei would be wholly confined to the region supplied by the two nerves. Hence Moebius has included all paralyses which are congenital, or first appear during infancy, and involve the nerves which supply the muscles of the eye, either alone or in association with the facial, under the name "infantile nuclear atrophy."

When the accompanying faults of development, such as astigmatism, webbed or crooked fingers, and a bifid uvula, are taken into consideration as the possible results of an abnormal process of growth, the question arises whether the entire defect may not depend on an irregular formation of the nuclei of the nerves. In support of this theory is the fact that in each of the cases described there was a perfectly circumscribed set of symptoms, which, once developed, remained unchanged, and never passed to any other region, while the affected person remained otherwise in good bodily and mental health.

A few remarks in regard to the innervation of the lachrymal gland may not be out of place in this connection.

In the case here reported, lachrymation could be produced by irritation of the cornea, or of the nasal mucous membrane, as well as by psychical emotion, a fact which deserves consideration in view of the at present unsettled question of the innervation of the lachrymal gland. The experiments of Wolferz, Demtschenko, Reich, and Tepliachine on the lower animals have demonstrated that the maintenance of the normally moist condition of the surface

of the eyeball is probably under the control of the sympathetic, and that a flow of tears may be occasioned through some of the fibres which come from the cervical ganglion, but this does not explain the occurrence of lachrymation from a psychical or a reflex cause. That secretory fibres reach the gland through the lachrymal and temporo-malar nerves has been proven by anatomical dissections, and by the fact that excitation of these nerves will cause a copious flow of tears.

Tepliachine found, as a result of his experiments on dogs, that excitation of the peripheral end of the trigeminus, exposed and divided at its exit from the medulla, caused a secretion of tears, while no such result was obtained from the same treatment of the facial and glosso-pharyngeal nerves. He also found an increase of secretion when he irritated either of the lachrymal or the temporo-malar nerves, and he further supported his theory by two clinical cases of co-existent left-sided paralysis of the facial and trigeminus nerves, in which no lachrymation could be produced in the eye on the paralyzed side by either a psychical or a reflex cause, and he urged that this was on account of the paralysis of the trigeminus, because that would accord with the results of his experiments.

Goldzieher advanced the theory that the secretory nerve fibres come from the facial, through the great superficial petrosal nerve, to the second branch of the trigeminus, and finally reach the gland with the temporo-malar nerve, a theory which finds support in the fact that the facial supplies the salivary glands through its union by the chorda tympani with the lingual and by the lesser superficial petrosal with the otic ganglion. Reich divided the trigeminus at a high point and, contrary to the experience of Tepliachine, could not cause lachrymation by irritation of its peripheral portion, although this could be caused by reflex action. Krause resected a portion of the trigeminus close to the Gasserian ganglion to relieve a case of incurable facial neuralgia, and the lachrymal gland continued to perform its functions as well as ever. Goldzieher quoted several clinical cases of peripheral facial paralysis in which

there was no power of lachrymation, and Kiranow observed in this clinic a man with facial paralysis and deafness on the right side, occasioned by disease of the petrous portion of the temporal bone, in whom lachrymation could be produced by excitation of the peripheral twigs of the trigeminus, although it could not be produced by psychical emotion. These observations demonstrate that the function of the lachrymal gland is affected in certain peripheral paralyses of the facial nerve, so as to render it impossible to respond to psychical causes, and that reflex lachrymation is not under the same control as psychical.

The results of the experiments on the lower animals have been so unsatisfactory and contradictory that it is necessary as yet to rely on clinical observations for the solution of this problem. These favor the theory that the numerous connections which the facial, glosso-pharyngeal, and sympathetic nerves make in the petrous portion of the temporal bone with the ganglia in the neighborhood send secretory fibres for the lachrymal gland through the spheno-palatine ganglion to the second branch of the trigeminus. The fact that in peripheral facial paralysis the tears appear to be altered supports the theory of Goldzieher, but the secretory fibres do not come from the facial nucleus, for in the case here reported this was destroyed without injury to the function of the gland. It therefore seems probable that these fibres originate in a region which, according to Eckhard, lies, in dogs, between the place of exit of the trigeminus and the fifth cervical vertebra, called by him the seat of the centres of secretion, and that the connection of the facial with the centre of secretion may be found in the fibres which, according to Edinger, extend from the spinal root of the trigeminus to the facial, or in other fibres as yet unknown.

AN IRIDECTOME, A NEW INSTRUMENT FOR THE PERFORMANCE OF IRIDECTOMY.[1]

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(*With a drawing.*)

AFTER witnessing with other operators, and experiencing myself, some of the difficulties and shortcomings attendant upon the present method of performing iridectomy with various forms of forceps and scissors, it occurred to me that these difficulties could in part be overcome if a suitable instrument were devised that combined forceps and scissors in one. This idea, as I heard later from instrument-makers in Vienna and Paris, had already been put into execution some years ago, but the resulting instrument was entirely unpractical. The same cannot, I believe, be said of the iridectome represented in Fig. 1, p. 632, inasmuch as I have used it successfully in a number of cases.

DESCRIPTION OF THE IRIDECTOME.

The instrument consists essentially of a pair of Weiss's iridectomy scissors (*Add'aa'*), at the top of which (*A*) is attached the upper end of a slender steel rod (*e*) which can be adjusted upwards and downwards. At the lower end of this rod two pieces of steel (*cb'* and *c'b*) cross in a joint (*f*), their lower ends being shaped like the points of iris forceps, and the upper ends consisting of plane steel springs (*c*, *c'*)

[1] Presented at the meeting of the Section on Ophthalmology and Otology of the New York Academy of Medicine, April 16, 1900.

which are pressed against the inner surfaces of the branches of the scissors by two smaller springs attached to the rod *e*. When the instrument is in a relaxed state, the tips of the forceps (*b*, *b'*) stand about 3–4 *mm* apart and are below the

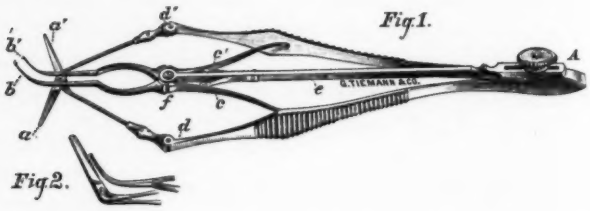

Fig. 1.

Fig. 2.

blades of the scissors, as seen in Fig. 1. This allows the introduction of the forceps into the anterior chamber without interference on the part of the scissor-blades. By unscrewing the button at *A* the forceps can be separated from the scissors, which facilitates the cleaning of the instrument and allows the scissors to be used alone like ordinary iridectomy scissors.

The mechanism of the iridectome is as follows: Pressure with the fingers upon the branches (*Ad*, *Ad'*) produces three separate results in this order: (1) the forceps-tips (*b*, *b'*) are brought together; (2) the relative position between the forceps-tips and scissor-blades is reversed, inasmuch as the latter pass below the former; and (3) finally the scissor-blades come together. The instrument then has the appearance as shown in Fig. 2. The various parts of the instrument are so proportioned that the closing of the forceps is completed while its tips are still *below* the scissor-blades, thus allowing the forceps to be introduced into the anterior chamber *closed*. Furthermore, the scissor-blades do not come together until the raising of the forceps-tips above them has been completed. When the pressure of the fingers is relaxed, the iridectome, by the elasticity of its steel springs, is at once restored to its original condition. The size of the piece of iris cut out will depend upon the amount of space between the forceps-tips and the scissor-blades when the iridectome is closed. This space can be varied from almost complete

contact to a distance of nearly 4 *mm* by means of the vertical adjustment of the rod (*e*) at *A*.

MANNER OF USING THE IRIDECTOME.

Before the operation is begun, the space between the forceps-tips and scissor-blades should be examined when the iridectome is closed, and should be made to correspond to the dimensions of the intended iridectomy. But very little experience with the instrument will teach the operator the proper adjustment for a certain desired effect. After the corneal or scleral section has been made, the operator takes the iridectome into either hand, choosing the one he finds more convenient, while with the other he fixes the eyeball. The iridectome should be held between the tips of the thumb and index and middle fingers, while the ulnar side of the hand is supported on the patient's forehead, thus securing complete steadiness. The seizing of the iris, which is the next step, is done just as with the ordinary iris-forceps, that is, with slight pressure of the fingers the forceps are closed, then introduced into the anterior chamber, relaxed sufficiently to grasp the iris, and again closed with the iris caught. It is important not to seize the iris at its pupillary margin, but rather at its middle, otherwise the coloboma may not be sufficiently peripheral. The caught iris is then drawn upwards, *not by further closing the iridectome, but by raising it as a whole.* In this way the operator can determine, before making the excision, whether the iris is yielding as much as he expected and whether his adjustment of the iridectome is correct. If not, it is not too late to make a change. But if all is well, he completes the operation by compressing the iridectome till it is closed and the portion of iris has been cut off. Though it has taken many words to describe the operation with the iridectome, not more than two or three seconds need elapse from the moment the iris is seized till the completion of the excision. The three steps of catching, drawing out, and cutting the iris are executed by the simple movement of bringing together the thumb and fingers of the hand holding the iridectome.

ADVANTAGES OF THE IRIDECTOME.

The advantages presented by the iridectome over the use of separate forceps and scissors, as they appear to me, are as follows: The combination of the two instruments in one leaves one hand of the operator free. He can therefore dispense with an assistant, inasmuch as he can fix the eyeball himself, and thus one hand less is needed around the small field of operation. Fixation by the operator himself has the further advantage of allowing prompter action in case of an emergency, since one mind can produce a quicker response than two, particularly if the assistant is not trained in that kind of work. Furthermore the iridectome is very easily handled, and as the operator can rest the whole ulnar side of the hand on the patient's forehead he gains greater steadiness than in the bimanual manipulations necessitated by the present method. Inasmuch as the scissors of the iridectome are already in place when the iris is grasped with the forceps, the interval between catching and cutting the iris is considerably shortened, a point which is of importance when the patient is restless or the iris sensitive. Finally, since the forceps and scissors have a definite relation to each other, the operator is more certain than with the present method, of obtaining a coloboma of a definite size, not larger nor smaller than he expected it to be. Not infrequently an operator, trying with the present method to perform a narrow optical iridectomy or only to fenestrate the iris, finds a wide coloboma resulting. This could not happen with the iridectome if it is so adjusted before the operation that, when the instrument is closed, the forceps almost touch the scissor-blades.

The above-named advantages of the iridectome have clearly appeared in five cases in which I was able to put it to a practical test. Three of the iridectomies were performed in operations for senile cataract, one for complicated cataract, and one for optical purposes in adherent leucoma. In the first case I seized the iris at the pupillary margin and the resulting coloboma was not as peripheral as I should have liked to make it. In the other cases, however, the

action of the iridectome and the operative results were entirely satisfactory.

LIMITATIONS TO THE USE OF THE IRIDECTOME.

Although the iridectome seems to me to possess the above-named advantages over the use of separate forceps and scissors in *most* of the conditions for which iridectomy is performed, I wish to emphasize the fact that it is *not* suitable for *all* cases of iridectomy. In general the contra-indication to its use may be said to exist in those cases in which the operator cannot foresee, before the operation, how the iris is going to act and how much it will yield to the traction of the forceps. If there are old and extensive posterior synechiæ, if the iris is widely adherent to the cornea, or if it is atrophic and friable, it may be impossible to know what adjustment to give to the iridectome before the operation, and therefore it is better in such cases to employ separate instruments. But even in these cases there is *no danger* in the use of the iridectome provided the operator bears in mind the directions given above, namely, that the iris should be drawn up in the same way as with the ordinary iris-forceps, and that he should not cut until he has assured himself that the iris has yielded sufficiently for the adjustment he has given the iridectome. If this is not the case he can readily let go of the iris and resort to whatever expedient is indicated by the circumstances.

The first model of the iridectome was made for me by Hunzinger of Cologne, Germany, and its present perfected form by G. Tiemann & Co., New York.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE FIRST QUARTER OF THE YEAR 1900.

By Dr. ST. BERNHEIMER, in Vienna; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin;

WITH THE ASSISTANCE OF

Dr. G. Abelsdorff, Berlin; Prof. E. Berger, Paris; Dr. Swan M. Burnett, Washington; Dr. Dalén, Stockholm; Dr. J. Herrnheiser, Prague; Prof. Hirschmann, Charcow; Dr. Krahnstöver, Rome; Mr. C. D. Marshall, London; Dr. P. von Mittelstädt, Metz; Prof. Da Gama Pinto, Lisbon; Dr. C. H. A. Westhoff, Amsterdam; and others.

Translated by Dr. Ward A. Holden.

Sections IV.–VII. Reviewed by Dr. ABELSDORFF, Berlin.

IV.—ANATOMY.

59. v. Hippel. Are medullated fibres of the retina a congenital anomaly? *Graefe's Archiv*, xlix., 3, p. 591.

60. Pick. Black optic nerves. *Arch. f. Augenheilk.*, xli., p. 96. (In a patient with medullated optic-nerve fibres there was an accumulation of pigment on the disc, most intense at the place of the physiological excavation.)

61. Tereschkowitsch. On coloboma of the optic nerve. *Arch. f. Augenheilk.*, xli., p. 100. (A combination of medullated fibres with coloboma of the optic nerve.)

62. Caspar. On the occurrence of isolated spots of medullated nerve fibres in the retina. *Arch. f. Augenheilk.*, xli., p. 195. (Four cases without the presence of analogous formations at the margin of the disc.)

63. Schoute. Trunks of venæ vorticosæ near the optic nerve. *Zeitschr. f. Augenheilk.*, iii., p. 228.

64. PICHLER. On the decussation of the optic nerves in man. *Zeitschr. f. Heilkunde*, xxi., 1, 1900.

65. SCHIRMANSKY. Three cases of congenital coloboma of the choroid. *Wjest. Ophth.*, 1899, No. 6.

66. SCHULTZE. Microscopic anatomy of the lens and zonula. *Graefe-Saemisch Handbuch*, second edition.

67. GREEFF. Microscopic anatomy of the optic nerve and retina. *Ibid.*

v. HIPPEL (59) believes that medullated fibres in the retina are congenital only in the sense of a disposition to this anomaly. They have never been seen in the new-born, the optic nerve being the last of the cerebral nerves to become medullated. In the rabbit the beginning of the normal medullation of the fibres at the sides of the disc can be observed when the eyes open on the tenth day.

SCHOUTE (63) describes four cases in which trunks of the venæ vorticosæ could be followed up to the neighborhood of the disc, their points of exit not being, as usual, near the equator of the eye.

PICHLER (64) examined the chiasm of a patient who died three weeks after the enucleation of a seeing eye.

The Marchi and Algeri methods were used and the chiasm cut in horizontal sections.

His conclusions are as follows :

1. There is a semi-decussation in the human chiasm.

2. In the chiasm and tracts the crossed and uncrossed fibres are not sharply separated, but mixed in various proportions.

3. The uncrossed fibres run in the lateral and dorso-lateral portions of the chiasm. In the tract they lie in the dorsal two thirds, close together in a ribbon-like zone between the upper and lower surfaces.

4. The crossed fibres occupy the middle portions of the chiasm.

5. These fibres run almost in a frontal plane from one half of the chiasm to the other, passing from the dorsal to the ventral surface. They collect at the floor of the chiasm, to either side of the median plane, into bundles running sagittally which enter the tracts.

6. A portion of the fibres, before entering the tract, pass in a short loop into the nerve of the other side.

7. These loops are present only in the ventral segment.

8. In the tract the crossed fibres lie mostly at the base and in their course backward remain in the ventral segment.

A small number of crossed fibres, mingled with the uncrossed, are distributed over the entire cross-section of the tract.

These results accord fully with those reached by Dimmer, who employed the same method on frontal sections of the human chiasm, and therefore disprove the view that the results obtained with Marchi's method are unreliable. HERRNHEISER.

SCHULTZE (66) gives a clear and comprehensive account of the microscopic anatomy of the lens and zonula. He regards the zonula as of epiblastic origin.

The first portion of GREEFF's (67) description of the microscopic anatomy of the optic nerve and retina is now published. After a general résumé, based on the neuron idea, he describes the nerve and its sheaths. The article has been thoroughly worked over, a description of the neuroglia and a discussion of Fuchs's peripheric atrophy having been introduced.

V.—PHYSIOLOGY.

68. BRUDZEWSKI. A contribution to the dioptrics of the eye. *Arch. f. Augenheilk.*, xl., p. 296.

69. REIMAR. On parallactic and perspective displacement in estimating differences of level in the eye. *Ibid.*, xli., p. 163.

70. LANS. On the width of the pupil. *Arch. f. Anat. u. Physiol. Phys. Abth.*, 1900, p. 79.

71. ABELSDORFF. The changes in the width of the pupil due to differences in the color of the illumination. *Zeitschr. f. Psychol. u. Physiol. d. Sinnesorgane*, xxii., p. 81.

72. SACHS. On the effect of colored light on the width of the pupil. *Ibid.*, p. 241.

73. URIBE-TROUCOSO. Theories of accommodation. Explanation of the accommodative descent of the lens. *Ann. d'ocul.*, xxiii., p. 161.

74. BICKERTON. Remarks on the Holmgren wool test: is it adequate for the detection of color-blindness? *Brit. Med. Journ.*, March 17, 1900.

75. WEILAND. Some disputed points about the entoptic observation of the circulation in the retinal capillaries. *Ophth. Record*, Feb., 1900.

BRUDZEWSKI (68) determined by means of a modification of the Javal-Schiötz ophthalmometer the refractive value of the cornea in the centre and in the periphery. He found that the cornea has not the shape of a regular figure of rotation ; the spherical aberration may be positive in the zones near the visual line (the periphery more highly refractive than the axis), and negative in the periphery of the pupillary region.

Since the total spherical aberration of the unaccommodated eye is never higher than that of the cornea, and is sometimes less, the lens must have a weak negative aberration.

REIMAR (69) calls attention to the fact that besides the parallactic displacement in the inverted image the apparent movement in perspective displacement in the upright image is of diagnostic value since it permits very slight differences in relief to be recognized.

LANS (70) in the physiological laboratory at Utrecht has studied the reaction of the pupil under an illumination of 1–1000-metre candles and with maximum adaptation. Accommodation, convergence, and psychical and sensory excitations were excluded.

With a light intensity of 0–25-metre candles the size of the pupil was determined by snap-shot photographs taken within the period of the pupillary reflex before a reflex closure of the lids occurred. After a quarter of an hour's adaptation the horizontal diameter of L.'s (aged twenty-nine) pupil, in absolute darkness, was 7.8 *mm.* With an illumination between 0- and 25-metre candles this decreased, at first rapidly and then more slowly.

Between 25- and 900-metre candles the average vertical diameter of the pupil in eleven persons between eighteen and thirty years of age decreased rapidly at first and then more slowly when the eye was illuminated.

The contraction of the pupil is simultaneous with the increase in acuteness of vision.

ABELSDORFF (71) made experiments with lights of the spectral colors and found that with adaptation for light, yellow causes more contraction of the pupil than the other colors. With adaptation for darkness blue causes a greater contraction.

SACHS (72) states that Abelsdorff's results confirm the results of his experiments on this subject in which colored pigments were used.

BICKERTON (74) cites the case of a naval officer who had mistaken the green light of an approaching vessel for a white one, though he

had successfully passed the tests required by the Board of Trade. He was again examined and stood the Holmgren wool test, though with the spectrum and other tests he exhibited a slight defect of red sensation. He matched an orange mixture with a pure yellow and called a true yellow match "too green." Bickerton believes that the Holmgren wool test is not a certain discoverer of the lesser marked forms of color-blindness and that a quantitative test for color should in addition be required.

ARNOLD KNAPP.

WEILAND (75) has convinced himself from experimentation that Helmholtz's idea in regard to the "flying flies" in the field of vision as seen through cobalt blue glass, on an even illuminated surface, as due, not to the shadow or reflexes of the blood corpuscles, but to a temporary stoppage in the circulation in the retinal capillaries, is the correct one. BURNETT.

VI.—REFRACTION AND ACCOMMODATION.

76. PFALZ. On perverse astigmatism—an acquired error of refraction. *Zeitschr. f. Augenheilk.*, iii., p. 16.

77. JAVAL. The etiological conditions of myopia. *Bull. de l'Acad. de Méd.*, Paris, Jan. 9, 1900.

78. DRUAULT. Astigmatism of the rays entering the eye obliquely. Application of skiascopy. *Arch. d'opht.*, xx., p. 21.

79. DEMICHERI. Treatment of myopia by removing the lens. The index of refraction of the lens. *Anales de oftalm.*, ii., No. 6.

80. BOTWINNIK. A contribution to the question of myopia in Israelites. *Wratsch*, 1899, No. 42.

81. IGNATIEFF. A case of myopia of high degree and its relations to the question of the etiology of myopia. *Wojenno med. Journ.*, 1900.

82. BYLSONA. On paresis of accommodation from diphtheria. *Med. Weekblad*, vi., 1900, No. 49.

83. BULL, C. S. The operative treatment of myopia of high degree by the removal of the crystalline lens. *Med. News*, Jan. 20, 1900.

84. STEVENS, E. W. Facial spasm and its relation to errors of refraction. *Amer. Journ. Med. Sciences*, Jan., 1900.

PFALZ (76) found that the total astigmatism against the rule steadily increases from 0 in the first decade of life to 27.9 per

cent. in the seventh decade. From this it follows that astigmatism against the rule appears with increasing growth of the body. According to Pfalz's measurements there is a decrease of corneal refraction, particularly in the vertical meridian, as the person grows older.

As to the proportion of the total astigmatism against the rule to the corneal refraction, there was in the second and third decades for the most part also corneal astigmatism against the rule. From the fourth to the sixth decade the proportion of cases of total astigmatism without asymmetry of the cornea increased, and only after the sixtieth year did the latter furnish the chief portion of the astigmatism.

BOTWINNIK's (80) statistics obtained from various sources lead him to the following conclusions: (1). Myopia is four or five times more frequent in Hebrews than in Christians, and more frequent in men than in women. (2). Hyperopia is less frequent than in Christians. (3). Myopia above 10 D is much more frequent in Hebrews than in Christians and more frequent in women than in men. (4). The average degree of myopia is higher in Hebrews than in Christians. (5). Myopia develops earlier in life in Hebrews. (6). Diminished acuteness of vision with myopia is much more frequent in Hebrews. (7). Choroidal and macular complications are more frequent. (8). Heredity disposition plays a greater rôle in the Hebrew, hence (9), the Hebrew must contend more against the development of myopia.

HIRSCHMANN.

BULL (83) in a long paper considers what has been written on the subject of lens extraction in high myopia. The contraindications are serious disease of any kind in the interior of the eye, a contagious conjunctivitis, and advanced age of the patient. He never operates under 12 D of M. If the central vision is not with correction sufficient for the social needs of the patient, and if there is a marked tendency to increase of the M, he considers the operation justifiable. BURNETT.

STEVENS (84) has had a number of cases of "facial spasm" in which he found a correction of the refractive error has had a decided influence. He thinks that in all cases of facial spasm the refractive error and muscular unbalance should be corrected.

BURNETT.

VII.—MUSCLES AND NERVES.

85. v. BECHTEREFF. On pupil-contracting and pupil-dilating centres in the posterior portions of the cerebral cortex in monkeys. *Arch. f. anat. u. Physiol. Physiol. Abth.*, 1900, p. 25.

86. GUILLERY. The effect of poisons on the fusion movements of the eyes. *Arch. f. d. gesammt. Physiologie*, lxxiv., p. 597.

87. BERNHEIMER. The regions of the roots of the eye nerves, their communications, and their connection with the cerebral cortex. *Graefe-Saemisch Handbuch*, 1900.

88. ANTAL. On the Westphal-Piltz so-called paradoxical pupillary phenomenon. *Neurol. Centralbl.*, 1900, p. 149.

89. UHTHOFF. Isolated paralysis of right and left lateral version of the eyes. Paralysis of divergence. *Allgem. Medicin. Central-Zeitung*, 1900, No. 15, p. 175.

90. MARGULIES. On the so-called Bell phenomenon in central paralysis of the facial nerve. *Wien. med. Wochenschr.*, 1900, Nos. 5 and 6.

91. BREGMAN. The reaction of degeneration in the levator and remarks on an isolated traumatic paresis of the oculomotorius and trochlearis nerves. *Kronika Lekarska*, 1900, No. 4.

92. MIKLACZEWSKI. On mydriasis saltans seu alternans. *Ibid.*, 1900, 1–2.

93. PLANTENGA. A case of recurrent oculomotor paralysis. *Ned. Oogh. Bydr.*, 1900, No. 9.

94. SCHOUTE. A contribution to the knowledge of torsion movements. *Ibid.*

95. MARLOW. A case of incomplete ophthalmoplegia externa. *Ophth. Record*, 1900, p. 6.

v. BECHTEREFF (85) found in the posterior portions of the cerebral cortex two pairs of centres which, being electrically stimulated, caused dilatation and contraction of the pupils with associated movements of the eyeballs. One centre lies near the anterior margin of the occipital lobe, the other in the parietal lobe. Bechtereff believes that the former pair may possibly be concerned in bringing about Haab's cortical reflex, and the latter the attention reflex of Piltz.

GUILLERY (86), continuing his studies on the effect of poisons on the mobility of the eyes (*Pflueger's Arch. f. d. ges. Physiol.*, 77), has investigated the action of poisons on the torsion movements.

A stereoscopic method was employed in which double images were produced. The experiments were done on the author himself after taking alcohol, morphine, chloral hydrate, trional, sulfonal, ether, and chloroform. It was found that the ability to perform torsion movements was reduced to a greater or less degree by all the poisons except morphine.

BERNHEIMER'S (87) chapter is one that was not present in the first edition of Graefe-Saemisch, and is a welcome résumé of the subject which has been worked up for the most part within the last decades.

The author, who has taken such an important part in the investigation of this difficult subject on the boundary line of ophthalmology, traces the course of the bundles of optic-nerve fibres, proving the semi-decussation in the chiasm, and then takes up the oculomotorius, trochlearis, and abducens, and, in so far as they concern the eye, the facialis, sympathicus, and trigeminus. In the second section the communications of the roots of the ocular nerves are described, and in the third section their connections with the cortex.

According to ANTAL (88) the so-called paradoxical pupillary reaction is caused when the lids are energetically pinched together (Westphal) or are held apart while the patient is urged to close them and then to cease (Piltz). On ceasing the effort the pupils contract and then dilate. This is a physiological process. If contraction does not follow the dilatation there is usually some nervous disease, when the test is made in Westphal's manner.

For obtaining the reaction in general Piltz's procedure is more reliable. The paradoxical pupillary phenomenon is found as a prodromal symptom while light reaction still remains, and also as a late symptom when the pupils no longer react to light or in accommodation.

UHTHOFF (89) presented a woman of twenty-six in whom both external and internal recti were paralyzed, only the left internus still having slight mobility. Her general condition was disturbed, and the symptoms indicated a lesion of the pons and the nuclear region of the abducens. In another woman of thirty-seven a paralysis of divergence was the only discoverable symptom.

MARGULIES (90) found that in three cases of central paralysis of the facial nerve Bell's phenomenon (upward turning of the eyeball when the lids are closed) was not present, while in cases of peripheral paralysis the symptom is readily observed. Although

these observations are not sufficiently numerous for a conclusive decision, nevertheless they indicate that Bell's phenomenon is an associated movement arising from the cerebrum, connected with the intact and functionally active will-path for the closure of the eye, since it disappears when this path is interrupted and returns when the path is restored.

SCHOUTE (94) measured the torsion movements of the eye with the apparatus devised by Prof. Mulder. He came to the conclusion that the torsion movements with inclination of the head are parallel to a fraction of a degree. He reports also on a symmetrical torsion movement which is constantly found when the head is turned to the right or the left. The upper halves of the meridians then incline toward the temples, just as in looking upward.

K. JIDA.

MARLOW (95) records the case of a woman of thirty-three who had restricted movements of the eyes in all directions. R, up 25°, down 40°, out 35°, in 30°. L, up 25°, down 38°, out 12°, in 12°. There was orthophoria in the central position. He regards it as congenital. There was no ptosis. BURNETT.

Sections VIII.–XII. Reviewed by DR. R. SCHWEIGGER, Berlin.

VIII.—LIDS.

96. THOINOT and GIROT. Malignant œdema of the lids. *Progrés Méd.*, 1900, No. 3.

97. PRAUN and PRÖSCHER. Malignant pustule of the upper lids and brows. *Centralbl. f. Augenheilk.*, Feb., 1900, p. 41.

98. PLAUTH. Gangrene of the lid from the excessive use of ice. *Klin. Monatsbl. f. Augenheilk.*, 1900, p. 35.

99. STRERATH. A contribution to the subject of vaccine blepharitis. *Inaug. Dissert.*, Giessen, 1900.

100. DULTZ. Trichiasis operations. *Inaug. Dissert.*, Koenigsberg, 1899.

101. DIANOUX. The treatment of congenital ptosis by Motais's procedure. *Ann. d'ocul.*, March, 1900, cxxii., p. 171.

102. NATHANSON. On the structure of cornu cutaneum. *Wratsch*, 1899, No. 43.

THOINOT (96) reports a case of malignant pustule of both lids, following the bite of an insect at the outer commissure. Under treatment with sublimate compresses there was recovery, but with

partial destruction of the upper lid, so that a plastic operation was required later. A bacteriological verification of the diagnosis was not obtained, but it was found that several animals of which the patient had charge had suffered from malignant pustule.

BERGER.

PRAUN and PRÖSCHER (97) saw two cases of malignant pustule of the lids. The pustules varied in size from that of a pea to that of a half-dollar ; some suppurated, others were bluish-red and when incised evacuated a gangrenous mass, after which healing occurred. The diagnosis could only be made by means of cultures.

PLAUTH (98) states that the expression " gangrene of the lid " is used not only for cases of destruction of tissue, with an offensive odor, but also for every necrosis to which the lid is disposed. Plauth's patient applied an ice-bag to the lids for twenty-four hours. The lid lost its covering epidermis by ulceration, but this was finally restored.

STRERATH (99) describes a case of vaccine blepharitis, coming on three days after vaccination of a child's arm. There were some pustules, a phlegmonous swelling of the lids, slight conjunctivitis, and intact cornea. A second case occurred in a woman of fifty-three, who had a blepharitis and then had been infected by a grandchild. The skin above the lid margin assumed a diphtheritic appearance, the conjunctiva became grayish yellow and chemotic, and furnished quantities of thin, purulent secretion, and the cornea became cloudy, but cleared up except for a small macula. The therapy must be mild : cleanliness and two-per-cent. boric acid.

DIANOUX (101) reports a case of congenital ptosis, in which Motais's operation for raising the upper lid by attaching a tongue-shaped flap of the tendon of the superior rectus to the lid gave a very good result. BERGER.

IX.—LACHRYMAL APPARATUS.

103. TERSON. Dacryoadenitis of blennorrhagic origin. *Bull. de la Société d'ophtal. de Paris*, March 5, 1900.

104. ROGMAN. On the tumors of the lachrymal gland. *Ann. d'ocul.*, Feb., 1900, cxxiii., p. 81.

105. VEILLON and MORAX. Gangrenous pericystitis. *Ibid.*, March, p. 175.

106. TRUC. Some grave lachrymal complications, orbital phlegmon, optic atrophy, panophthalmitis, meningitis. *Ibid.*, Feb., 1900, p. 94.

107. GUNN, DONALD. Lachrymal obstruction in the young. *Ophth. Review*, Feb., 1900.

108. HAWLEY. Mucocele in the new-born. *Jour. Amer. Med. Assoc.*, Feb. 17, 1900.

TERSON (103) reports a case of metastatic dacryoadenitis in a woman of thirty-eight with a urethral blennorrhœa. She recovered after using inunction treatment for a month. Only three similar cases have been reported previously, those of Seeligsohn, Panas, and Terson.

ROGMAN (104) reports a case of tumor of the lachrymal gland, which, on microscopic examination, showed the characteristics of an endothelioma springing from the ducts of the gland.

BERGER.

VEILLON and MORAX (105) describe a case of acute phlegmonous dacryocystitis with the formation of a fistula in which the pus had a most fœtid odor. The skin over the lachrymal sac was infiltrated and of violet color. A portion of the infiltrated tissue was cast off. Bacteriological examination revealed the presence of the streptococcus pyogenes and two anaerobic micro-organisms, one corresponding to the bacillus funduliformis (Veillon and Zuber, Halle), the other an undescribed coccobacillus. The gangrenous process is, according to Veillon and Morax, due to the simultaneous presence of the streptococcus and the other two micro-organisms, the fœtid odor not being present in diseases of the lachrymal passages caused by the streptococcus alone. An antiseptic treatment with cyanide of mercury and sounds led to a complete cure. BERGER.

From TRUC's (106) important paper it appears that a chronic dacryocystitis or a phlegmon of the region of the sac may lead to severe septic affections of the eye. He reports an interesting case and gives a résumé of those previously published. In two cases of dacryocystitis orbital phlegmon developed with optic neuritis and atrophy, in one case following curettage of the sac. Cases of orbital abscess after the introduction of sounds (Valude) and injections (de Wecker) have been observed to end in optic-nerve atrophy. In one case (Leplat) death occurred from meningitis. In a case of purulent dacryocystitis in a woman suffering from diabetes Truc saw panophthalmitis leading to blindness in

both eyes. The diabetes had doubtless favored the development of the panophthalmitis, still there was unquestionably metastatic ophthalmia, caused by the local focus of infection in the sac.

BERGER.

According to GUNN (107) lachrymal troubles are most frequent in adults past middle age and in young children. In the first group a cause usually cannot be found; in the latter, on the contrary, this is the exception. The primary cause in children is an obstruction at the lower part of the duct caused by some developmental fault. The cases in children appear early or late. The early group contains cases of obstruction with a dilated nasal duct or cases generally associated with conjunctivitis but no evidence of a dilated duct. The late group includes cases of syphilitic children or where there is a tuberculous disease of the bones of the nose or orbit. Cases are described illustrating each of these varieties. ARNOLD KNAPP.

HAWLEY (108) has seen six cases of mucocele in the new-born. The indications are to establish drainage into the eye if it is not possible to get it into the nose. For this purpose he makes a small opening on the external surface of the tumor under an anæsthetic. Probing is sometimes necessary.

BURNETT.

X.—ORBIT AND NEIGHBORING CAVITIES.

109. LAGRANGE. Encysted hydrops of the bursa of Tenon. *Bull. de la Soc. d'opht. de Paris*, Feb. 6, 1900.

110. VERNEUIL. Osteitis of the summit of the orbital cavity. Phlebitis and thrombosis of the ophthalmic vein and of the cavernous sinus. Phlegmon of the orbit. Death. *Ann. de la Soc. Belge de Chirurg.*, 1900, No. 2.

111. DIANOUX. Hyperostosis of the orbit. *Bull. de l'Acad. de Méd.*, Paris, March 20, 1900.

112. SCHOELER, FRIEDRICH. Four cases of orbital injury. *Inaug. Dissert.*, Berlin, 1900.

113. WAGENMANN. Echinococcus of the orbit in a boy of six. *Deutsche med. Wochenschrift*, 1900, No. 15.

114. SCHLODTMANN. On the extirpation of retrobulbar tumors with preservation of the eyeball, and the clinical condition of the eye after the operation. *Festschr. f. A. v. Hippel*, Halle, 1900.

115. GOLOWIN. Two cases of pulsating exophthalmus successfully operated upon. *Chirurgia*, Oct., 1899. From an abstract in *Wratsch*, 1899, No. 51.

116. WINKLER. On the treatment of suppuration of the frontal sinus. *Münch. med. Wochenschr.*, 1900, No. 3, p. 77.

117. WEINHOLD. A case of cystic dilatation of an ethmoid cell. *Klin. Monatsbl. f. Augenheilk.*, Jan., 1900, xxxviii., p. 30.

118. OLIVER. A case of traumatic varix of the orbit in which ligation of the left common carotid was successfully performed. *Amer. Journ. Med. Sciences*, March, 1900.

119. GUTTMANN. Retrobulbar abscess due to empyæma of the maxillary antrum and ethmoidal sinus resulting from dental caries. Operation; recovery. *Annals of Ophth.*, Jan. 7, 1900.

120. MURRAY. An unusual case of orbital gonorrhœa, infection following irritation from an artificial eye—complicated by septic endocarditis. Death and autopsy. *Ophth. Record*, Feb., 1900.

121. BELLOWS. A case of fracture of the orbit with unusual symptoms. *Ophth. Record*, March, 1900.

In a case in which LAGRANGE (109) had diagnosed tumor of the optic nerve and intended to extirpate it with preservation of the ball, it was found during the operation that there was a collection of liquid in the encysted posterior portion of Tenon's capsule. The appearance of tumor of the optic nerve vanished after the escape of the liquid, and vision rose from $\frac{1}{25}$ to $\frac{1}{10}$. A similar case was reported by Caron de Villards in the *Annales d'oculistique* for 1858. BERGER.

DIANOUX (111) reported on a case of exostosis of the inner wall of the orbit in a girl of nineteen which had caused exophthalmus and diminution of vision. There were no symptoms of syphilis. With the help of the Roentgen rays the position and extent of the exostosis was determined and it was chiselled off. After the operation the eye resumed its normal position and the acuteness of vision became normal.

To his own observation SCHOELER (112) adds the reported cases of orbital injury which are sometimes followed by amaurosis. The complete blindness usually passes off in from three to fourteen days, but the vision remains poor, and there are defects in the field, and reduced color perception. In such cases there is either direct injury of the optic nerve by a foreign body or compression by splintering of the orbit or by hemorrhage.

In WAGENMANN'S (113) case a cyst was removed by operation, and microscopic examination proved it to contain a dead echinococcus in process of absorption. The process is characterized by marked inflammation of pronouncedly purulent character and is due to the phlogogenic action of the entozoon.

SCHLODTMANN (114) discusses the appearance of the retinal blood-vessels after division of the optic nerve. Sometimes the vessels are empty, sometimes moderately large, or even of normal calibre. Vessels small at first may become large afterwards, this indicating intrascleral anastomoses, since at the ora serrata there are none. The retina does not regularly become pigmented, and this is perhaps only dependent upon destruction of the anterior ciliary arteries, as from rupture of the muscles. As regards the final cosmetic effect and the position and mobility of the eye, the results are better after Knapp's operation than after Krönlein's. The latter should never be used for purely diagnostic purposes; it however offers easier access to deep-seated tumors.

In GOLOWIN'S (115) first patient, a woman of nineteen, the lids were swollen and there was slight ptosis. On the upper lids near the inner commissure, on the sides of the nose, and on the cheeks were several round, bluish, compressible nodules, pulsating synchronously with the pulse. The fatty tissue of the orbit was wanting, but the fundus, acuteness of vision, and ocular movements were normal. On palpation of the eyes pulsation could be felt in the orbit. The veins in the palpebral conjunctiva were much dilated. The first changes in the eyes were noticed thirteen years before.

Trauma was denied. The author made an incision from the bridge of the nose above the upper margin of the orbit, exposed the dilated veins, and after ligating removed them. This operation was done on the other eye six weeks later. The course of healing was favorable. All the dilatations disappeared. The author thought that the communications between the artery and the vein in the cavernous sinus had arisen from menstrual retention.

2. A woman of thirty-one. The lids of the right eye swollen, the veins of the skin dilated, the ball displaced forward and outward. Pulsation synchronous with the arterial pulse. Cornea, conjunctiva, and right half of the face anæsthetic. Cornea cloudy in the centre. Disc pale. V=0. Paresis of the motor branch of the fifth nerve. Left eye normal. These changes were due to a

revolver shot in the right temple. The ball was discovered in the maxillary bone by means of the Roentgen rays. The outer wall of the orbit was resected according to Krönlein's method, the dilated pulsating vein was tied, and the bone flap returned to place. There was partial suppuration of the orbit. The exophthalmus disappeared. HIRSCHMANN.

WINKLER (116) states that in operations on the frontal sinus, the ethmoid must be avoided carefully. The anatomical connections between the two sinuses and the size of the frontal sinus often show in operations great variability.

Jansen's method should not be used in cases in which the orbital contents are not disturbed.

Kuhnt's method by breaking down the anterior wall is indicated only in

1. Disease of the anterior wall of the sinus (fistula, necrosis, etc.).

2. Rhinogenous cerebral disease or suspicion of empyæma breaking through the posterior wall.

3. A multicellular frontal sinus.

4. A small frontal sinus and uncomplicated suppuration of the frontal sinus.

Otherwise, since the defects caused are so disfiguring, the osteoplastic methods of Czerny and Küster are preferable. Obliteration of the frontal sinus is not always necessary, it often being sufficient to clear out the sinus and furnish it with an exit.

In WEINHOLD'S (117) case of dilatation of the ethmoid there was only at the inner angle of the eye, projecting into the orbit, an oval tumor as large as a bean, without certain fluctuation, and no other symptoms upon which to base a diagnosis. When opened a cavity lined with mucous membrane was found, which contained a cloudy liquid and had pressed through the lachrymal bone into the orbit and was limited laterally by the displaced lamina papyracea of the ethmoid. There was no communication with the nose. The lamina and the mucosa were removed. The author considers it probable that it was a case of old hydrops of one or several ethmoid cells which had been cut off and distended by the increasing contents.

OLIVER'S (118) patient was a man of twenty-seven years who had had a crush of the head, some years before and quite recently a blow on the left side of the head, after which the eye symptoms appeared. There were an exophthalmus and almost complete fixity

in the orbit, with enlargement of the conjunctiva from congestion. Retinal veins much swollen, pupil inactive to light or consensually. No bruit in orbit, but on temporal region. The left common carotid was ligated with a complete subsidence of these symptoms after a time, but the eye was lost through a glaucomatous attack.

BURNETT.

The patient whose history is recorded by GUTTMANN (119) was five years old and complained of slight toothache. This was followed by symptoms which are characteristic of abscess of the antrum and implication of the orbital contents. Pus was liberated by incising the lids, and after the tooth was extracted the antrum was pierced and drained. The ethmoid was also found to be diseased and was curetted and drained. A final recovery was the result. BURNETT.

In MURRAY'S (120) case the infection of the conjunctiva came from an artificial eye. There was a urethral gonorrhœa. Soon after symptoms of endocarditis set in and the patient died therefrom. The autopsy confirmed the diagnosis. BURNETT.

In BELLOWS'S (121) case, after a severe injury to the orbit, resulting in a paralysis of the inferior rectus of left eye with ecchymosis of the conjunctiva, there was manifest a monocular vertical diplopia in that eye. At twenty feet the candles were separated about two inches. This symptom gradually wore off.

BURNETT.

XI.—CONJUNCTIVA.

122. KESSLER. Conjunctivitis of animal origin. *Ned. Oogh. Bijdr.*, 1900, No. 9.

123. SCHANZ. On the diphtheritic inflammations of the conjunctiva. *Zeitschr. f. Augenheilk.*, iii., 3, p. 193.

124. V. AMMON. On the diagnosis and therapy of ophthalmia neonatorum. *Münch. med. Wochenschr.*, 1900, No. 1.

125. LAMHOFER. On the treatment of ophthalmia neonatorum. *Ibid.*, No. 8.

126. ADDARIO. Anatomical and bacteriological investigations on trachoma. *Arch. f. Augenheilk.*, xli., 1, p. 20.

127. ADLER, HANS. New methods of treating trachoma. *Wiener med. Presse*, 1900, No. 7.

128. VIEUSSE. A contribution to the study of tuberculosis of the conjunctiva. *Rec. d'opht.*, Jan., 1900, p. 1.

129. KUHNT. Extensive tuberculosis of the conjunctiva and cornea cured by an attack of facial erysipelas. *Zeitschr. f. Augenheilk.*, iii., 3, p. 146.

130. FRANKE. Pemphigus and essential shrinking of the conjunctiva. Bergmann, Wiesbaden, 1900.

131. STRZEMINSKI. A case of glanders of the palpebral conjunctiva cured by the galvano-cautery. *Rec. d'opht.*, 1900, 1, p. 8.

132. STEPHENSON, SYDNEY. Diphtheria of the conjunctiva. *Lancet*, Feb. 17, 1900.

133. SHOEMAKER and ALT. A case of almost symmetrical papilloma-like tumors of the conjunctiva of both eyes. *Am. Jour. of Ophth.*, March, 1900.

134. MORTON. A brief clinical study of conjunctival ulceration. *Ophth. Record*, March, 1900.

KESSLER (122) describes a case of acute conjunctivitis with marked thickening of the conjunctiva, associated with swelling of the glands, fever, and œdema of the pharynx and glottis. These symptoms accorded with those which Parinaud has described as infectious conjunctivitis of animal origin. The disease, according to the author, was acquired from a horse suffering from staggers, and is to be regarded as an infection with the streptococcus equi, which causes this disease in horses. JIDA.

SCHANZ (123) maintains that Neisser's method of staining the granules does not make it possible to distinguish true, virulent diphtheria bacilli from the pseudo-diphtheria bacilli. He agrees with the view that innocent diphtheria bacilli may, on a proper culture medium, become malignant, and believes that this may happen in fibrinous membranes developing on the conjunctiva from other causes. The present classification of conjunctival diseases according to their clinical features should not be supplanted by a new classification from an etiological standpoint.

LAMHOFER (125), like von Ammon, has treated blennorrhœa of the new-born and of adults without medicaments. He has the conjunctival sac washed out every hour with an undine, and corneal complications have never appeared except in weakly infants in whom keratomalacia developed. The use of pencils and other instruments is likely to accomplish nothing more than injury to the cornea.

According to ADDARIO (126) both the new and the old trachoma granules exhibit a faintly stained interior with large cells

and a darkly stained marginal zone with small cells. The lighter portion is well outlined and is composed of large, closely packed cells. Among the dark cells one can distinguish clearly a loose connective-tissue framework which can be followed also into the centre of the granule. The trachoma granule has nothing in common with the tubercle, but corresponds to the lymph nodules which may develop in any mucous membrane. Both these formations have capillary blood-vessels, while the lymph cells are not found in lymphatic capillaries but in cleft-shaped spaces. Over the larger granules the conjunctival epithelium is altered and flattened. Besides the granules there may be a papillary proliferation as in chronic blennorrhœa. The granules flatten and evacuate their contents more or less completely, almost never with suppuration ; or they undergo a partial necrosis and are absorbed. In every case, however, they cause a new formation of connective tissue in their neighborhood, which leads to a cicatrix in the adenoid layer of the conjunctiva. Bacteriologically the author came upon a new sort of bacillus arranged in threads, which he believes to be a variety of the xerosis bacillus.

ADLER (127) finds that all medicaments are of some value in the treatment of trachoma. The rubbing in of sublimate is of value only in follicular catarrh. Electrolysis and the galvano-cautery are of service in some cases. Grattage injures the membrane too much. Expression of the granules may be done with the finger-nails or better with Knapp's roller forceps or Kuhnt's expressor.

VIEUSSE (128) reports on three cases of tuberculous disease of the conjunctiva which appeared in two cases in the form of an ulcer and in one case in that of granulations. Recovery after the use of the galvano-cautery. As regards the development of conjunctival tuberculosis the author believes with Audry that like lupus of the face it arises from tuberculous ulcers of the nasal mucosa.

KUHNT (129) describes a case of spontaneous recovery from extensive tuberculosis of the conjunctiva and cornea after an attack of erysipelas of the face. The ulcerated preauricular, sublingual, and submaxillary glands cicatrized at the same time. For months the tuberculosis had resisted all forms of treatment. Similar processes occur ; besides the relation of erysipelas to malignant tumors, there is an antagonism between the erysipelas streptococcus and the bacillus of splenic fever.

FRANKE (130) has collected the literature of the subject and distinguishes an acute affection with the formation of vesicles on the skin and conjunctiva, a similar chronic affection, and a conjunctival affection of similar character without any affection of the skin. Of the first category only a few cases have been seen. They recover in 2–3 weeks. The third category is the most interesting. Here the mucosa of the nose and mouth may be affected like the conjunctiva. The characteristic feature of the affection is the final shrinking of the conjunctival sac and the partial adhesion of the margins of the lids. The etiology mostly cannot be made out. Pemphigus of the skin is rarely present. It is better to use Graefe's designation, "essential shrinking of the conjunctiva," or the author's "shrinking of the conjunctiva with the formation of vesicles." As regards therapy, even transplantations into the conjunctival sac are useless, since finally they shrink and disappear.

In a veterinary surgeon of thirty-six STRZEMINSKI (131) observed a glanders nodule as large as a pea in the conjunctiva of the lower lid. It was successfully treated by excision. Bacteriological examination revealed the presence of characteristic glanders bacilli. In the cases hitherto reported the original seat of the affection has sometimes been the nasal mucosa and in several there have been metastatic abscesses of the orbit. BERGER.

Croupous conjunctivitis, according to STEPHENSON (132), has the same relation to diphtheritic conjunctivitis that rhinitis fibrinosa has to nasal diphtheria. A culture should be made in every case of membrane on the conjunctiva. Stephenson's practice is to inject antitoxin immediately, if the case is suspicious, even before the result of the culture is ascertained. The term croupous should be given up and the cases divided into mild and severe. The treatment consists of a fifteen per cent. solution of permanganate of potash applied daily in painting; weak antiseptic washes as cleansing agent. The report of a mild case is adjoined.

ARNOLD KNAPP.

The patient of SHOEMAKER (133) from whom the tumors, examined by ALT, were removed, was a man of forty. The vision in the right eye had been failing for a year; the left for a less time. In R there was a tumor of considerable consistency on the conjunctiva in the palpebral aperture, 7 *mm* in width and 2 *mm* in thickness, which passed entirely over the cornea. In the left a similar tumor was on the nasal side but passed only to near the

centre of the cornea like a pterygion. A portion of the tumor of the right eye was removed and examined by Alt. A careful study of the sections, illustrated by photo-micrographs, is recorded, revealing the following points of interest: The tumors plainly originated from the conjunctival or episcleral tissue and gradually grew towards the cornea, pulling the conjunctiva after them. The younger parts of the tissue contain trachoma granules. There is also manifest a degeneration of a hyaline character in the older parts. It is in these portions also that the tendency to a papillomatous structure is very pronounced, with a central vessel and thick layers of epithelial cells, which in some parts shows a character almost epitheliomatous. It seems to Alt that there was first a soft fibroma, which became infected with trachoma and later developed the papillomatous character. BURNETT.

MORTON (134) believes that ulcers of the conjunctiva are much more common than is generally supposed. By the use of fluorescin they can be readily detected, if not too superficial. He thinks they are important factors in the production of pterygium BURNETT.

XII.—CORNEA, SCLERA, ANTERIOR CHAMBER.

135. SNELLEN, Jr. On ribbon-shaped keratitis. *Nederl. Oogh. Bijdr.*, No. 9.

136. KRUKENBERG. Two cases of keratoconus. *Münch. med. Wochenschr.*, 1900, No. 5.

137. DE WECKER. Papilloma of the cornea. Methylen blue dressing. *Ophth. Klinik*, iv., 1.

138. STÖLTZING. A contribution to the etiology and therapy of episcleritis periodica fugax. *Münch. med. Wochenschr.*, 1900, No. 7.

139. UHTHOFF. A further contribution to the pathological anatomy of scleritis. *Graefe's Archiv*, xliv., 3, 539.

140. ALT. Another case of epithelioma of the sclero-corneal region cured by galvano-cautery. *Amer. Jour. of Ophth.*, Feb., 1900.

SNELLEN (135) has scraped off the opaque layer of the cornea in several cases of ribbon-shaped keratitis. The opaque masses were found to consist of carbonate and phosphate of lime.

JIDA.

KRUKENBERG'S (136) patient had a keratoconus whose apex

was so thin that it expanded and retracted synchronously with the pulse. This could be followed with the ophthalmometer, and the patient recognized it from the variations in his circles of diffusion. Compression of the carotid caused all variations to cease.

STÖLTZING (138) considers episcleritis fugax, which is often preceded by neuralgia of the fifth pair and reddening of the hands, the local pain often being disproportionate to the injection, to be a vasomotor affection. Iodide of potassium alone is of benefit, and this acts quickly.

UHTHOFF'S (139) description corresponds in considerable measure to those of Schlodtmann and Friedland. The affection began as an infiltration of the anterior portion of the episclera, while the severe choroiditis appeared later. Uhthoff did not find the pronounced necrotic foci seen by the other authors. Tuberculous foci were not found, nor were micro-organisms present.

ALT (140) reports an additional case of epithelioma at the corneo-scleral margin in a man of forty-seven years. A first removal with the knife was followed by a return two and a half months after excision. Destruction with the galvano-cautery has not been followed by a recurrence for at least eighteen months.

BURNETT.

Sections XIII.-XVIII. Reviewed by DR. O. BRECHT, Berlin.

XIII.—LENS.

141. BÄHR. A contribution to the pathology and therapy of lamellar cataract. *Deutsche med. Wochenschr.*, 1900, 9, p. 144.

142. IMRE. Experiences with cataract extraction. *Ungar. Beiträge z. Augenheilk.*, ii., p. 31.

143. SCHULECK. Instruments, and particularly a capsule forceps, for the Graefe operation. *Ibid.*, p. 225.

144. WALDMANN. The operation for luxated cataracts. *Ibid.*, p. 189.

145. FEILCHENFELD. Observations on a case of injury to the lens. *Graefe's Archiv*, xlix., p. 574.

146. ALT. Notes on the microscopical conditions found in a case of so-called black cataract. *Amer. Jour. of Ophth.*, Jan., 1900.

147. ALT. On zonular cataract, with the microscopical examination of an extracted lens. *Ibid.*

148. HARLAN. Prolapse of the iris after simple cataract extraction. *Ophth. Record*, Feb., 1900.

149. FINLAY. A series of one hundred cases of cataract extractions. *Arch. f. Ophth.*, xxix., p. 54.

150 GREENWOOD. Bilateral spontaneous dislocation of the lens. *Ophth. Record*, viii., 11, p. 566.

151. BULLER. An instrument intended to facilitate the operation of capsulotomy. *Ophth. Review*, xix., p. 25.

152. POLLAK. Personal recollections of early cataract extractions. *Amer. Jour. of Ophth.*, 1900, p. 36.

In 88.75 per cent. of his cases of lamellar cataract, BÄHR (141) found rickets. He prefers discission to iridectomy.

FEILCHENFELD's (145) case was one of iron injury, causing total aniridia and cataract.

ALT (146) found in a "black" cataract he examined after extraction not only the much-enlarged nucleus, reaching almost to the capsule, consisting of sclerosed lens fibres, but also in the deep layers of the fibres a quantity of pigment, which does not seem to come from blood, but is the remains of the destroyed pigmented epithelial cells. BURNETT.

ALT (147) has had an opportunity of examining a lens which was affected with zonular cataract, but afterwards became generally opaque. The result of this examination is given in a series of sections with description of the conditions which is too elaborate for abstracting. The conclusion he reached, however, is that those findings favor the theory which assumes an obstacle to the original development of the lens—that is, of a really congenital origin of the condition. BURNETT.

As a result of his experience with simple extraction, HARLAN (148) concludes that prolapse of the iris is by no means so serious as some are disposed to regard it, and that small hernias may be let alone. More extensive prolapses are to be promptly excised, if there is no danger of infection. In a few cases replacement may be possible. BURNETT.

XIV.—IRIS.

153. GROENOUW. Anatomical investigations on serous iridocyclitis. *Klin. Monatsbl. f. Augenheilk.*, xxxviii., p. 186.

154. COPPEZ. Two cases of melano-sarcoma of the iris and ciliary body. *Jour. Méd. de Bruxelles*, 1900, No. 6.

155. MELLINGER. Iritis purulenta; recovery. *Thirty-fifth Annual Report of the Eye Institute at Basle*, 1899.

156. BELL, G. H. An operation for the relief of an incarcerated iris. *Med. Record*, Feb. 24, 1900.

157. COLLINS, TREACHER. Pigmented growth of the iris. *Trans. Ophth. Soc. Un. K.*, xix., p. 53.

158. GRIMSDALE. Nævus of iris. *Ibid.*, p. 61.

159. MARSHALL. Implantation cysts of the iris. *Ibid.*, p. 54.

GROENOUW (153) examined the eyes, optic nerves, and chiasm of a patient of sixty, who in life had presented the clinical picture of unirritative serous iridocyclitis. Microscopically he found a considerable round-celled infiltration of the iris, particularly in its anterior layers, and a less dense infiltration of the deeper layers of the iris, the margin of the cornea, and the ciliary body. There were accumulations of round cells on the ciliary processes and the posterior surface of the cornea, while Descemet's membrane and the epithelium were intact. Round cells and fibrillæ were found in the anterior portion of the vitreous and close to the optic disc. The choroid, retina, optic nerves, and chiasm were free from signs of inflammation, so that this case does not bear out the migration theory.

BELL (156) reduces an incarcerated iris by one sweep of a Graefe knife introduced after the manner of making sclerotomies, retaining a conjunctival flap. The forceps are then introduced, the iris excised, and the columns of the coloboma replaced and the conjunctival flap reapplied. BURNETT.

XV.—CHOROID.

160. DESPAGNET. Ossified fibroma of the choroid. *Ann. d' ocul.*, cxii., p. 371.

161. KAMOCKI. A case of disseminated sarcoma of the choroid. *Zeitschr. f. Augenheilk.*, p. 32.

162. SCHIMANSKI. Three cases of congenital coloboma of the choroid. *Wjest. Ophth.*, xvi., 6, p. 502.

163. STIEREN. A report of two cases of metastatic choroiditis occurring in children, following measles. *Penn. Med. Jour.*, Jan., 1900.

164. De Schweinitz and Steel. Clinical and histological study of a melanotic sarcoma of the choroid, with recurrence of the growth in the orbit five months after enucleation of the eyeball and one extrascleral mass. *Ophth. Record.*, Mar., 1900.

165. Hotz. Profuse retrochoroidal hemorrhage after iridectomy for chronic glaucoma. *Ibid.*

166. Rowan. Metastatic carcinoma of the choroid from a primary carcinoma of the lung. *Trans. Ophth. Soc. Un. K.*, xix., p. 103.

167. Silcock. Choroidal gumma. *Ibid.*, p. 69.

168. Yarr. Central choroido-retinitis, resembling an optic disc, in a patient suffering from glycosuria. *Ibid.*, p. 68.

Stieren (163) reports two cases of metastatic choroiditis, "pseudo-glioma," occurring in children who were convalescing from measles. No other cause was apparent. Burnett.

The patient whose case is reported in full by De Schweinitz and Steel (164), was a man aged thirty-six, who had a tumor in the eye diagnosticated five years before the time of enucleation. The eye was then in a state of acute glaucoma with a cataractous lens and adherent pupil. There was a return of the growth in the orbit five months afterward and the contents were taken out, revealing a slight invasion of the ethmoid cavity and the antrum. Some months after there was no return of the growth in the orbit. An examination of the eye showed the growth to be flat or cake-like, rather than round, and encircling the optic-nerve entrance, with infiltration at the iris angle; retina detached; a small floating nodule in the vitreous. The optic nerve was infiltrated with the non-pigmented sarcoma cells, as was also the nerve sheath. There were also pigment-bearing cells and pigment inside the vessels without an apparent lesion of the wall.

Burnett.

Hotz (165) has met with one of those distressing instances of profuse intraocular hemorrhage sometimes following cataract extraction, in a case of iridectomy for simple glaucoma. The patient was a woman of sixty-three years; the operation was perfectly smooth under a general anæsthetic. In about twenty hours she was seized with severe pain suddenly, and when the bandage was removed the contents of the eye was on the dressing. The eye was allowed to atrophy, not being removed. Burnett.

XVI.—VITREOUS.

169. LAWSON. Left, vascular formation in the vitreous in a case of diabetes; right, immature diabetic cataract. *Trans. Ophth. Soc. Un. K.*, xix., p. 268.

XVII.—GLAUCOMA.

170. MOHR. A contribution to the subject of the extirpation of the superior cervical ganglion for glaucoma. *Klin. Monatsbl. f. Augenheilk.*, xxxviii., p. 159.

171. STRACHOW. Two cases of glaucoma in eyes with retinitis pigmentosa. *Med. Obosr.*, Nov., 1899.

172. SACHSALBER. Complete obliteration of the retinal vessels in absolute glaucoma. *Centralbl. f. pr. Augenheilk.*, xxiv., p. 6.

173. WAGNER, W. On the clinical picture: iritis glaucomatosa. *Ibid.*, p. 44.

174. WALDMANN. The influence of iridectomy on the prognosis of glaucoma as shown in 99 cases followed for a considerable time. *Ungar. Beiträge z. Augenheilk.*, ii., p. 185.

175. TRUC and CAUVIN. Iridectomy in chronic simple glaucoma. Some late results. *Arch d'opht.*, xx., p. 1.

176. STERLING. Operative treatment of chronic glaucoma. *Journ. Amer. Med. Assoc.*, 1900, No. 7.

MOHR (170) reports on three cases of extirpation of the superior cervical ganglion in glaucoma. In the first, the effect was good at first, but a fresh attack came on ten weeks later. An iridectomy was then done, after which the eye was lost from retrochoroidal hemorrhage. In the second case, the result was good during the three months that the patient was kept under observation and the visual field gradually grew larger. In the third case, glaucomatous symptoms reappeared a week after the operation, but yielded to eserine. In all three cases, the immediate effects of the resection were narrowing of the pupil and reduction of tension to the normal. An unpleasant result in the third case was paræsthesia.

In one of STRACHOW's (171) cases chronic glaucoma came on in one of the eyes with retinitis pigmentosa, in the second case in both eyes, only one of which had retinitis pigmentosa. The author believes that glaucoma is not rare in eyes with retinitis pigmentosa, but that it is not likely to be noticed because the

vision has already suffered from the retinitis, and any further decrease is apt to be attributed to the retinitis.

HIRSCHMANN.

WAGNER (173) describes a case of recurrent iritis with contraction of the field of vision and increased tension, in which myotics proved to be of greater value than mydriatics.

XVIII.—SYMPATHETIC OPHTHALMIA.

177. PETERS. Tuberculosis and sympathetic ophthalmia. *Zeitschr. f. Augenheilk.*, iii., 5, p. 385.

178. SOURDILLE. Sympathetic ophthalmia cured with enucleation of the injured eye. *Clin. Ophth.*, 1900, No. 22, p. 255.

179. SPICER HOLMES. Onset of sympathetic ophthalmitis two weeks after excision of the injured eye. *Trans. Ophth. Soc. Un. K.*, xix., p. 260.

180. VENNEMANN. A case of sympathetic papillo-retinitis. *Soc. Belg. d'opht. Bull.*, 7, p. 51.

181. PFALZ. On sympathetic irritation. *Zeitschr. f. Augenheilk.*, 1900, p. 233.

182. GIFFORD. Clinical notes on sympathetic ophthalmia *Annals. of Ophth.*, Jan. 7, 1900.

183. DE SCHWEINITZ. Blindness from sympathetic ophthalmitis; restoration of vision by Critchett's operation. *Ophth. Record*, Feb., 1900.

In connection with a special case, PETERS (177) calls attention to the fact that slow bilateral iridocyclitis with the formation of nodules, presenting the picture of sympathetic ophthalmia, may be due to tuberculosis.

GIFFORD (182) gives a very careful and detailed account of three cases of sympathetic ophthalmia, caused respectively by a piece of steel entering through the cornea and lens, a traumatic inflammation from the pecking of a bird's bill, and an entanglement of the iris after cataract extraction. He considered them all typical cases except perhaps the last. The most important deductions he draws from the study of these cases are: first, there were no premonitory symptoms, such as photophobia, ciliary injection, or asthenopia; second, the importance of examining the state of the vision daily, as this is usually the first manifestation of the disease; thirdly, the use of larger doses of salicylate of soda in the treatment, giving as much as 150 grains a day.

Though there were no germs discovered in the two eyes that were enucleated, Gifford still clings to a germ origin of the disease. He finds the uveal tract infiltrated with leucocytes, which also often pass out of the eye along the course of the choroidal vessels, but he did not find many in the nerve itself or the sheath.

BURNETT.

In DE SCHWEINITZ's (183) case a man of fifty-three had sympathetic ophthalmitis from injury to the fellow eye which, however, was removed. The closed pupil over a cataractous lens was enlarged by two needles, used after the manner recommended by the elder Critchett, with a very satisfactory result; vision, with correcting glasses, being $\frac{5}{15}$.

BURNETT.

Sections XIX.–XXII. Reviewed by PROF. GREEFF, Berlin.

XIX.—RETINA AND FUNCTIONAL DISTURBANCE.

184. VELHAGEN. A very rare form of retinal detachment and iridocyclitis. *Arch. f. Ophth.*, xlix., p. 599.

185. SELENSKOWSKY. On the structure and origin of retinal glioma. *Wratsch*, 1900, No. 5.

186. SIEGRIST. A contribution to the knowledge of the anatomical foundation of alcohol amblyopia. *Arch. f. Augenheilk.*, xli., p. 136.

187. KOSTER. A peculiar case of congenital hemeralopia. *Ned. Tydschr. v. Geneesk.*, No. 13.

188. SANTOS FERNANDEZ. Hemeralopia treated with the physiological serum of the horse. *Rev. gén. d'opht.*, No. 2, p. 49.

189. GERHARDT. Blue-blindness with shrunken kidney. *Münch. med. Wochenschr.*, 1900, No. 1.

190. KUHNT. On a peculiar change at the macula (retinitis atrophicans sive rareficans centralis). *Zeitschr. f. Augenheilk.*, iii., No. 2.

191. HOOR. A peculiar change at the macula and retinitis circinata. *Ibid.*, No. 1.

192. THOMPSON, H. WRIGHT. An unusual case of embolism in the fundus oculi. *Lancet*, Jan. 6, 1900.

193. DE SCHWEINITZ. A case of retinitis circinata. *Ophth. Record.*, Jan., 1900.

194. HOTZ. Two cases of peculiar visual perversion. *Ibid.*

195. DOWLING, FRANCIS. Tobacco amblyopia. *Journ. Amer. Med. Assoc.*

196. JENNINGS. Torpor of the retina due to exposure in the Klondike. *Amer. Journ. of Ophth.*, Jan., 1900.

197. MITCHELL. Snow-blindness. *Ophth. Record*, March, 1900.

In VELHAGEN'S (184) case there was a complete detachment of the retina including the pars ciliaris retinæ, the entire membrane being retracted into the posterior portion of the ball so that it suggested the existence of a solid tumor.

SELENSKOWSKY (185) examined the eye of a child two and a half years of age after enucleation for glioma. The tumor filled the entire space between the optic nerve and lens, and at some points had passed through the zonula into the anterior chamber. It had also invaded the posterior surface of the lens and passed 3 *mm* back into the optic nerve along the central vessels. The tumor consisted of the ordinary groups of cells arranged in a cylindrical manner about blood-vessels. Stained by the Golgi method the tumor was found to consist of glia cells and tissue and nerve cells of various sizes. It seemed to spring at different points from four different layers, viz., the nerve-fibre, ganglion-cell, and two nuclear layers, supporting Greeff's view that glioma develops from embryonal deposits of neuroglia and nerve cells lying dormant in any layers of the retina until particular conditions occasion the development of the tumor.

HIRSCHMANN.

SIEGRIST (186), having removed the optic nerves from a man's dead body, found microscopically a marked shrinking at the temporal sides. Microscopically there was found the well-known atrophy of the papillo-macular bundle with proliferation of the interstitial connective-tissue, indicating in the author's opinion a primary interstitial neuritis of this bundle.

KOSTER (187) describes a case of congenital circumnuclear cataract in which the color was so regular and transparent that in good illumination the patient had normal vision, but as the illumination was diminished the vision decreased considerably. After removal of the lens the hemeralopia disappeared.

SANTOS FERNANDEZ (188) calls attention to two cases previously reported by him of rapid recovery from hemeralopia after subcutaneous injections of the serum of the horse. Since both patients had also symptoms of hysteria they did not seem to

Santos Fernandez to be above suspicion. He now adds two new observations of cases uncomplicated with hysteria. Altogether three injections of 20 *cc* each were given, improvement following the first, and recovery occurring after four or five days.

BERGER.

GERHARDT (189) states that patients with shrunken kidney have voluntarily told him that they recognized all colors clearly, except blue. Gerhardt adds the reports of Koenig and Simon who found blue-blind areas in the retina in twenty-five persons, of whom fourteen had albuminuric retinitis, three syphilitic retinitis, three central retinitis of unknown origin, and five detachment of the retina.

The vision in the right eye of a young woman, aged nineteen, seen by THOMPSON (192), became suddenly very much obscured, without apparent cause; though she had had attacks of transitory blindness in right eye for three years. There was an absolute scotoma, triangular in outline, extending up and in from point of fixation. The retina between disc and macula, and partly embracing the latter, which appeared as a cherry spot, was œdematous. The macular arteries were smaller than those in the other eye. Rest in bed, alkalines, diuretics, and nitroglycerine were prescribed. The retina and macular arteries regained their normal appearance in eight days. Vision was improved, though finally there was temporal atrophy of the optic nerve, and the scotoma persisted. Thompson regards this as a case of embolism of the common macular or cilio-retinal artery, the embolism being caught at its origin. The occlusion lasted ten days, during which time the nutrition of part of the retina involved was maintained by small branches of central retinal artery, and by the end of that time the embolus was carried farther into the ciliary circulation. The macular arteries appeared singly near the margin of the optic disc.

ARNOLD KNAPP.

DE SCHWEINITZ (193) describes and illustrates with a fine colored plate the appearance of a case of retinitis circinata in a woman of seventy-seven years who had noticed trouble with her eyes some eight years before. It was a typical case in one eye, but in the other deviated from this in so far as the macular region also had a white spot. $V = \frac{8}{200}$. There was no change at the end of five months.

BURNETT.

In case 1, HOTZ (194) records an instance of a bright girl of ten years, who could not read the book unless it was turned upside

down. The last letter looked to her inverted. Large objects appeared erect. On complete atropinization the difficulty disappeared. Case 2 was a boy of six years. In reading he turned the book upside down and for 5 made £, for 13, £1. At twenty feet letters seemed all right. Under atropine and with a proper glass the trouble vanished. Boy seemed otherwise healthy.

BURNETT.

DOWLING (195) made a careful investigation among the tobacco manufacturers of Cincinnati, examining 153 men and 50 women. Among the latter, he found two cases of amblyopia, who had handled moist tobacco as cigar rollers for a large number of years. Neither of them smoked, chewed, or drank. Most of the men do all three, and some of them in excess. Of the men, twenty-three were affected more or less with amblyopia and other signs of tobacco poisoning. Myosis is a very common symptom. Central scotoma for red is nearly constant. He thinks chewing is more productive of toxæmia than smoking. BURNETT.

In the case reported by JENNINGS (196) the conditions were not those usually observed in snow-blindness, though the patient had been exposed to the glare of snow and to a temperature of 50° below zero. The trouble in vision, without pain, was first noted in the morning after a night of exposure to intense cold. There was torpor of the retina, which was vacillating, V going from $\frac{5}{5}$ to $\frac{5}{20}$ in a few moments. There were no marked changes in the fundus except some fine changes at the m. l. No central scotoma, but marked, though changing contraction of the V. FF.

BURNETT.

MITCHELL (197) gives the picture of a primitive eye-protector used in Alaska for protection against snow-blindness. It consists of a pair of "goggles" carved out of a single piece of wood, with a small aperture to look through, and a projecting shelf above as a further protection. It is said to serve its purpose admirably.

BURNETT.

XX.—OPTIC NERVE.

198. PICK. Black optic discs. *Arch. f. Augenheilk.*, xli., p. 96.

199. HORMUTH. On hereditary affections of the optic nerves. *Beiträge z. Augenheilk.*, 1900, xlii.

A black optic disc from pigmentation of the nerve fibres is but rarely seen ophthalmoscopically, only six cases having been re-

ported. PICK (198) reports a new case discovered accidentally in a girl of seven with high myopia. In the right eye a great mass of white medullated nerve fibres extended out radially and irregularly from the disc. In the middle of the disc was a dark brown, almost black, discoloration interrupted by the reddish appearance of some vessels. In all the cases reported the pigmentation has been congenital, and it may be due to an insufficient absorption of the optic-nerve pigment which is excessively developed in the embryo.

HORMUTH (199) continues Leber's reports on hereditary diseases of the optic nerves. He gives the clinical history of six families seen by Leber in Goettingen between 1873 and 1887, and goes deeply into the literature.

XXI.—INJURIES, FOREIGN BODIES, PARASITES.

200. CRAMER. Entrance of a shot into the optic nerve without injury to the ball and with preservation of vision. *Zeitschr. f. Augenheilk.*, iii., p. 152.

201. JOLLY. A case of bilateral paralysis of the facial nerve. *Deutsche med. Wochenschr.*, 1900, No. 9.

202. TOYL. A case of traumatic irideremia with luxation of the lens but without rupture of the ball. *Zeitschr. f. Augenheilk.*, iii., No. 2.

203. HAAB. Traumatic perforations of the macula lutea. *Ibid.*

204. SEGOLCKE. On the pathological anatomy of echinococcus of the orbit. *Graefe's Archiv*, xlix., p. 561.

205. TALKE. Contusion of the eye by a flash of lightning. *Wojenno med. Journ.*, 1900, ii.

In CRAMER's (200) patient, after a shot injury two wounds of entrance were found at the inferior margin of the left orbit. There was a large central scotoma, $V = \frac{1}{6}\frac{1}{5}$, but otherwise everything was normal. The optic nerve must have been injured centrally from the entrance of the central vessels. Radiographs showed that the shot lay near the optic foramen. Vision increased to $\frac{1}{1}\frac{1}{5}$. The scotoma became much smaller and merely relative.

JOLLY (201) reports a case of bilateral paralysis of the facial nerve depending upon a trauma, in all probability there being a fracture of the base. There was lagophthalmos on both sides. When an attempt was made to close the eyes, the upper lids fell

scarcely at all, while the eyes rolled upward until the corneæ disappeared from view (Bell's phenomenon). The cornea of the right eye was clear, there having been no keratitis e lagophthalmo, but the cornea of the left eye was quite destroyed in the centre, and there was considerable inflammation. The cause was a left-sided affection of the fifth nerve, so that this condition of the left eye was due to a neuroparalytic keratitis and not to a keratitis e lagophthalmo.

HAAB (203) calls attention to the fact that often after severe contusion of the eye the macular region exhibits an injury in the shape of a round hole more or less sharply differentiated from its surroundings. The hole is always surrounded by a gray ring. In the hole, which is proved to be a depression by the parallactic displacement, the color seen is not pure red, but a stippling of white and yellow.

SEGOLCKE (204) examined an orbital tumor removed by Wagenmann, which proved to be an echinococcus cyst about 3 *cm* in diameter, with a dense wall and soft contents. In the exudation making up the contents were several small nodules, which proved to be small daughter vesicles.

TALKE (205) reports the case of a soldier who was struck by lightning and had the hair of the left side of the head and face singed. Beneath the left orbit was an injury resembling that caused by a hot iron. The patient was deaf. The left lids were swollen, and there was a grayish stripe across the cornea. The pupil was small, and under atropine dilated irregularly. The eye became normal again, but the hearing did not return.

HIRSCHMANN.

XXII.—OCULAR AFFECTIONS IN GENERAL DISEASES.

206. SALINGER. The treatment of cataract in cases of general disease. *Inaug. Dissert.*, Berlin (Hirschberg's clinic), 1900.

207. PROKOPENKO. Unusual case of choroiditis. *Wjest. Ophth.*, 1900, No. 1.

208. VALUDE. Visual and ophthalmoscopic disturbances of cardiac origin. *Ann. d'ocul.*, cxxiii., p. 194.

209. BOREL. Hystero-traumatism and pseudo-hystero-traumatisms of the eye. A clinical and medico-legal monograph. *Ibid.*, p. 1.

210. ZEEPER. On skin and eye affections in persons who work over hyacinth bulbs. *Ned. Oogh. Bydr.*, No. 9.

211. HEDDÆUS. On the treatment of scrofulous eye diseases. *Wochenschr. f. Ther. u. Hyg. d. Auges*, Apr., 1900.

212. BRECHT. On eye affections in late hereditary syphilis. *Charité-Annalen*, 1899, xxiv.

213. DÜRING and TRAUTAS. Ophthalmoscopic changes in leprosy. *Deutsche med. Wochenschr.*, 1900, No. 9.

214. WOLFF, A. On syphilitic papules of the ocular mucosa. *Berl. klin. Wochenschr.*, 1900, No. 3.

215. BRUNS and STÖLTING. On affections of the optic nerves in the early stages of multiple sclerosis. *Zeitschr. f. Augenheilk.*, iii., Nos. 1 and 2.

216. HAWTHORNE. The eye symptoms of locomotor ataxia, with a clinical record of thirty cases. *Brit. Med. Jour.*, March 3, 1900.

SALINGER (206) describes Hirschberg's methods of dealing with cataract patients who suffer from general diseases. If the patient has diabetes, a Carlsbad treatment is instituted, and if improvement takes place, the operation is done without iridectomy. Diabetic coma after operation is avoided by testing the urine with aceton and rejecting the suspicious cases. Alcoholic patients have morphine given them immediately after the operation, and hydrate of chloral and alcohol in the evening. In chronic affections of the air-passages it is generally best to operate with iridectomy on account of the danger of having the wound forced open.

PROKOPENKO'S (207) patient was a man of forty-eight, on whom a gastro-enterostomy was made. Six days later foci of pneumonia were found in the right lung and later an abscess appeared in the scrotum. The right eye suddenly became blind from purulent choroiditis. In pus from the eye and from various abscesses that formed, as well as in the blood, the staphylococcus aureus was found. HIRSCHMANN.

VALUDE (208), in a cyanotic patient with a heart lesion, observed a progressive diminution of vision. In the fundus there was nothing abnormal except excessive venous stasis. The patient died with symptoms of asystole. At the autopsy there was found great congestion of the veins of the brain and hemorrhages in both cortical visual centres, more extensive on the right side than the left. At the last test R V = $\frac{2}{3}$, L V = $\frac{1}{10}$.

BERGER.

The comprehensive paper by BOREL (209) treats of the eye symptoms arising from traumatic hysteria and their significance from a medico-legal aspect. A single symptom of hysteria may appear, such as erythropsia, astigmatism in consequence of partial spasm of the fibres of the ciliary muscle, bilateral mydriasis, lachrymation (with or without unilateral hyperidrosis of the face, spasm of the ocular muscles, insufficiency of convergence, and the like).

It is noteworthy that several months may elapse after the trauma before the hysterical symptoms appear.

The affection which ZEEPER (210) describes consists in conjunctivitis with photophobia associated with itching of the face and arms. The cause lies in the dry dust about the bulbs, which contains small worms and larvæ and small needle-shaped crystals. When the author rubbed some of this dust on his arm it caused this itching, which lasted for twenty minutes.

The great value of the local use of calomel and the yellow salve in many scrofulous affections of the eye suggests a specific action of these mercurial preparations, and leads one to try to obtain a similar result by using mercurials internally or through the skin. In earlier times calomel was much used as an anti-scrofulous remedy, but to-day it is less frequently employed. Yet it should not be altogether forgotten. For years HEDDÆUS (211) has prescribed calomel in nearly every case of phlyctenula and blepharo-adenitis. His results are so good that he wishes to call the attention of practitioners to the value of this drug. He gives as many milligrammes per diem as the infant is months old, and as many centigrammes as the young child is years old. After the age of five the dose cannot be increased in the same ratio, and the ordinary precautions must be taken to avoid poisoning. Gray ointment acts even more quickly and more energetically than mercurials given internally.

BRECHT (212) reports on the retinal changes due to hereditary syphilis as seen in three children of one family. A point of interest was the fact that two of the children exhibited no signs of syphilis except pigmentary degeneration of the retina and general weakness. Apparently the mother had become infected after the birth of the first child, which was healthy. She had been pregnant eleven times, and had aborted three times, and had eight living children of whom six died early. She has a sunken bridge of the nose and ozæna. These cases show that the correct in-

terpretation of the ophthalmoscopic picture may enable one to diagnose hereditary syphilis even when all other signs are wanting.

Düring and Trautas (213) found ten patients with leprosy who had a more or less pronounced peripheral chorio-retinitis similar to the syphilitic form. There were patches of various sizes and colors. For the most part they were dark, but often atrophic. External affections of the eye are very common in leprosy but changes in the fundus have not hitherto been described.

Bruns and Stölting (215) in their introduction take up the literature of the eye symptoms in multiple sclerosis, emphasizing the statement of Oppenheim's that optic neuritis or atrophy may precede the onset of the disease by many years. They then report on three carefully studied cases which confirm this view. Among 5500 cases of nervous disease seen by them in the course of twelve years, the diagnosis multiple sclerosis was made 70 times, or in 1⅓ %. Of these, 21, or 30 %, had some affection of the optic nerve. Excluding 32 cases in which the diagnosis was not altogether certain, the 21 cases with optic-nerve affections, all of which were in the remaining 38 cases, would make the percentage 58.

Hawthorne (216) states that the eye symptoms—the Argyll-Robertson pupil, ocular paralyses, and optic-nerve atrophy—may precede evidence of any spinal lesion. It is probable that in those cases where the disease first affects the nervous apparatus of the eyeball the spinal symptoms are slight in degree and delayed in development. Thirty cases were reported with a view of supporting the following conclusions: (1) that any one of these ocular disturbances may exist as an isolated symptom for a considerable time, presumably for years; (2) that any two of these may be associated together with an increasing presumption that the diseased process causing them is of the locomotor ataxia order; (3) that any one of the three, or a combination of two or of all of them, may exist in conjunction with a greater or less degree of evidence of spinal disease; and (4) that occasionally a case which commences with purely ocular symptoms may be seen to develop, with comparative rapidity, characteristic symptoms of the spinal lesion of locomotor ataxia. Arnold Knapp.

BOOK NOTICES.

XVII.—**Injuries to the Eye in their Medico-Legal Aspect.** By Dr. S. Baudry, Professor in the Faculty of Medicine University of Lille, France ; a portion of the medico-legal chapter, which consists of eight pages, being credited to Professor Jacquey. Translated by Dr. Alfred James Ostheimer, Jr. Revised and edited by Dr. Charles A. Oliver. With an adaptation of the medico-legal chapter to the courts of the United States by Charles Sinkler, Esq. Furthermore, four persons are mentioned in the American editor's preface as having given assistance during the preparation of the English manuscript copy.

Philadelphia, New York, Chicago : The F. A. Davis Company, 1900.

It does not appear that this little book of 140 pages of text, small octavo, contains much more information in regard to injuries of the eye than is to be found in any elementary text-book of ophthalmology, not to mention Praun's recent exhaustive work on the subject. And the contents of the short medico-legal chapter do not seem to differ particularly in kind from the usual platitudes in legal verbiage which the professor of legal medicine offers in his annual lecture at the medical school. W. A. H.

XVIII.—**A Manual of Personal Hygiene.** Edited by Walter L. Pyle, A.M., M.D., Assistant Surgeon Wills Eye Hospital, Philadelphia. W. B. Saunders & Co., Philadelphia, 1900.

A neatly gotten up 8vo. vol. of 344 pages, treating of a subject of universal importance in an admirable way and in such a manner as to be interesting and instructive to any physician of whatever denomination or occupation he may be, and it will be useful to every educated man or woman, in particular to mothers and teachers. The contents are divided into seven departments, each

written by an authority in that branch, viz.: Hygiene of the Digestive Apparatus, by Charles G. Stockton, Buffalo; Skin and its Appendages, by Geo. H. Fox, New York; The Vocal and Respiratory Apparatus, by E. Fletcher Ingals, Chicago; The Ear, by B. Alex. Randall, Philadelphia; The Eye, by Walter L. Pyle, Philadelphia; The Brain and Nervous System, by J. W. Courtney, Boston; and Physical Exercise, by G. N. Steward, Cleveland. The part relating to the Hygiene of the Eye occupies 105 pages, introducing—in keeping with the other departments—the subject by a general description of the eyeball and its diseases. The chief chapters are on ametropia and eye-strain, visual tests, the general care of the eyes and school-hygiene (infant eyes, the dangers of the kindergarten,—giving young eyes too much near-work,—the school-hygiene is treated in full detail), spectacles, and eyeglasses.

The whole book is written in a conservative spirit, containing nothing particularly new, but it is highly attractive by its easy, yet careful style. It will have a large circle of readers, for it helps the general practitioner to acquaint himself with what he will care to know of the most important so-called specialties—the higher senses, the cutaneous, digestive, respiratory, muscular, and nervous apparatuses,—whereas the specialist will read with great satisfaction the essentials of the other departments. He will regret that the circulatory system has not been included in this useful, popular-scientific treatise. H. K.

MISCELLANEOUS NOTES.

Dr. von Grosz has been appointed Professor of Ophthalmology at Budapest.

Prof. Eversbusch at Erlangen has been appointed successor to Prof. A. v. Rothmund (resigned) in Munich.

Dr. Bach of Wurzburg has been appointed Professor in Ordinary at Marburg.

Prof. Oeller in Munich has been appointed Professor in Ordinary at Erlangen.

The A. von Gräfe triennial prize has been awarded to Prof. Hess at Wuerzburg, and Dr. St. Bernheimer in Vienna.

Correction.—My attention has been called to a mistake in proof-reading in the foot-note of my paper on Double Nasal Hemianopsia (these Archives, xxix., 1, p. 1.), in which it is stated

that Veasey's article on Nasal Hemiopia appeared in the "Ophthalmic *Review*," whereas it should have been the "Ophthalmic *Record*."

SWAN M. BURNETT.

The Third Pan-American Medical Congress will be held in Havana, Cuba, December 26, 27, 28, and 29, 1900.

President: Dr. Juan Santos Fernandez.

First Vice-President: Dr. Gustavo Lopez.

Treasurer: Dr. Enrique Acosta.

Secretary: Dr. Thomas V. Coronado.

Place of the Executive Commission, Prado, 105.

The sessions will be held from 8–11 A.M., and from 3–5 P.M. Authors of papers should send an abstract—not exceeding 300 words—to the Secretary, before Nov. 15th.

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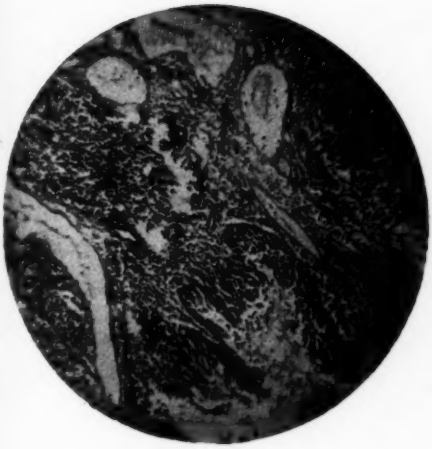

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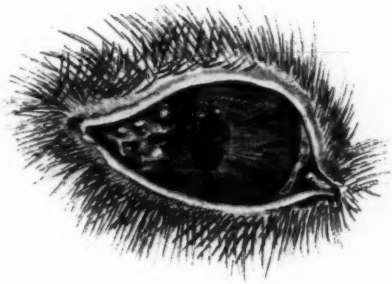

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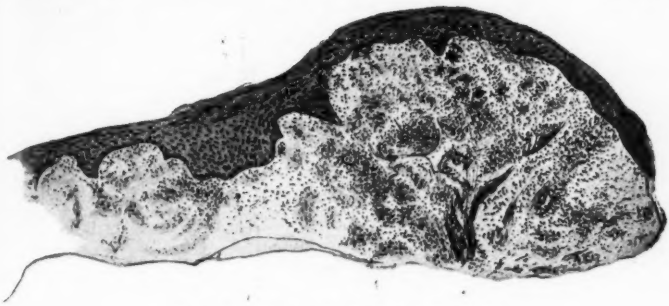

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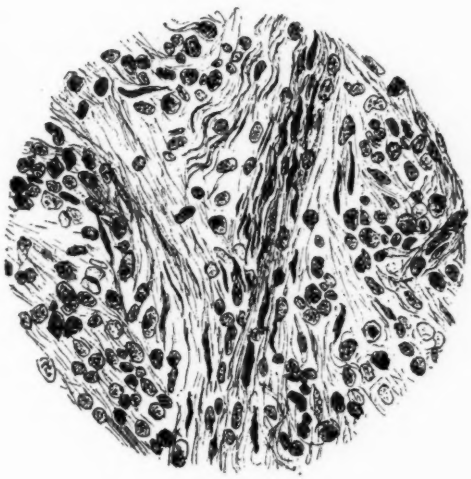

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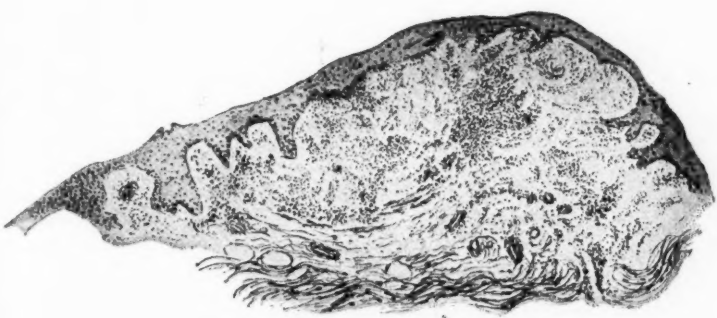

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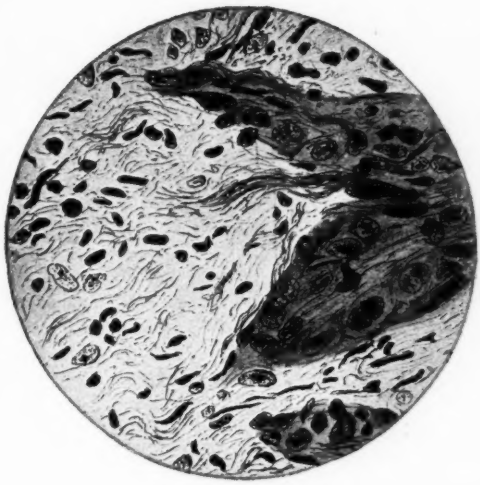

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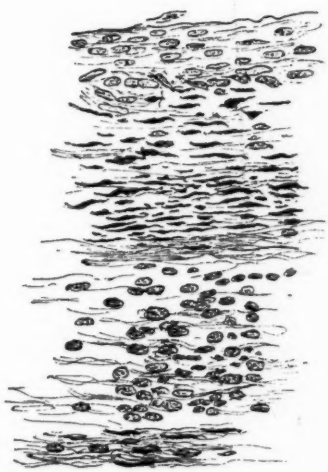

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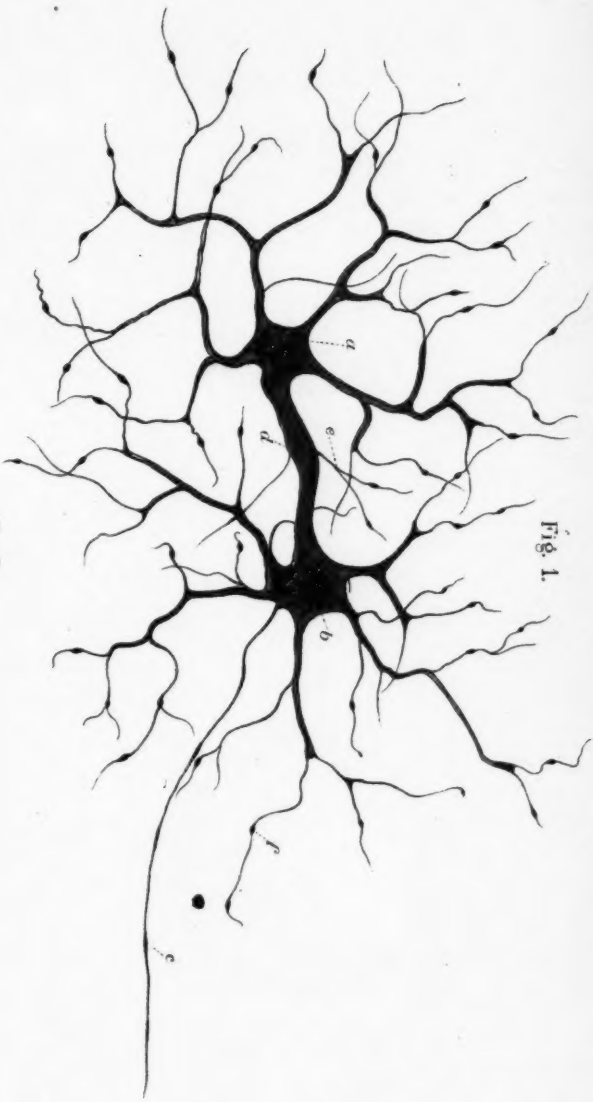

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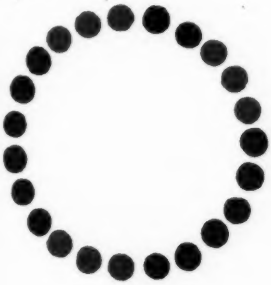

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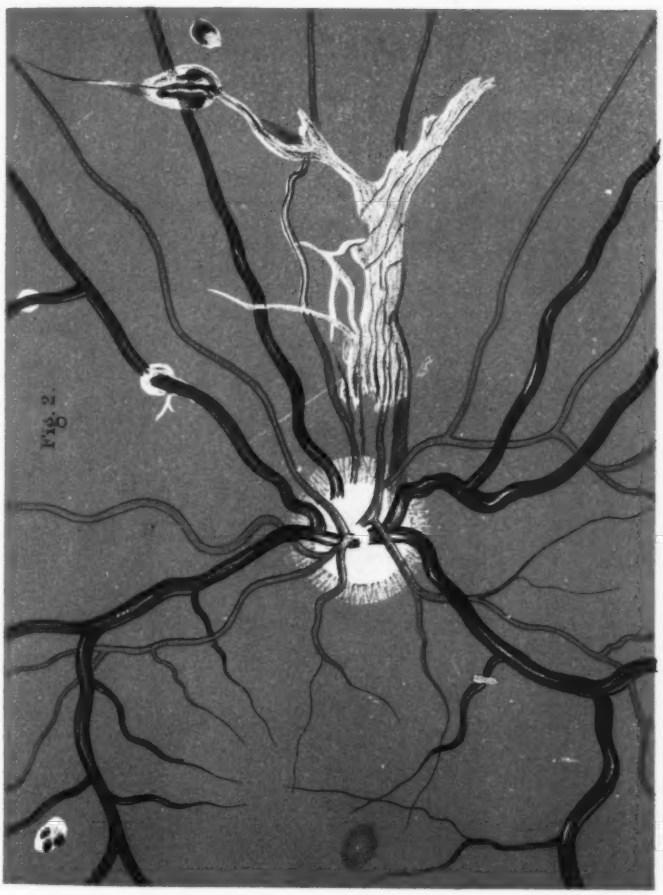

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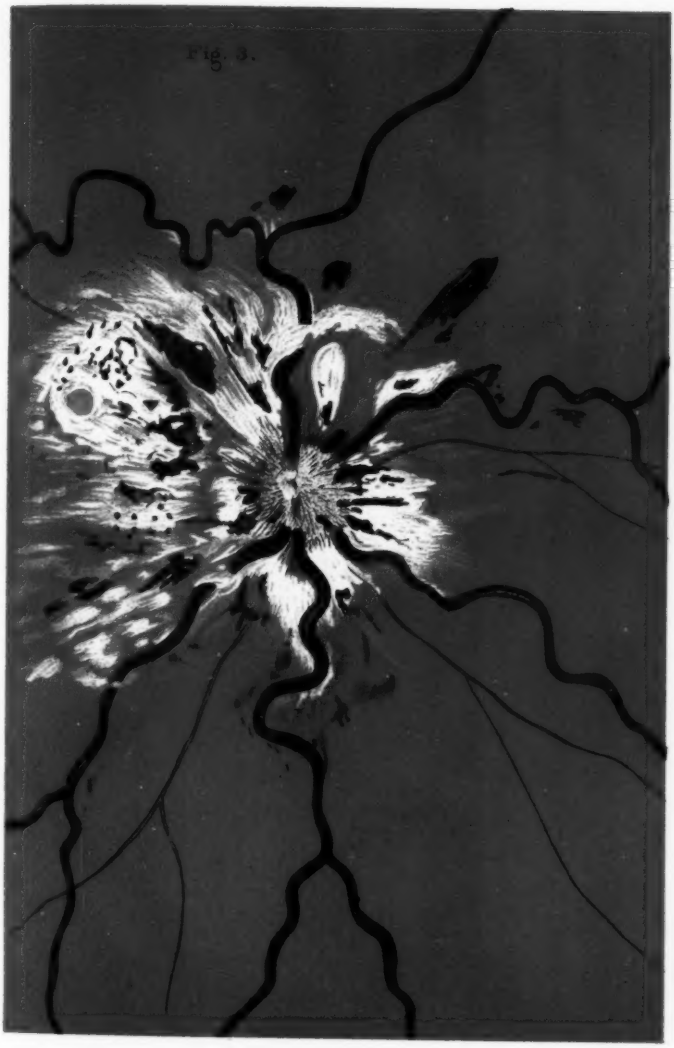

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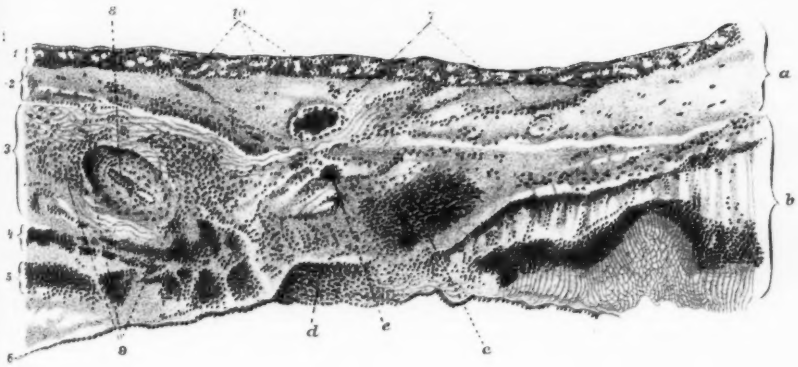

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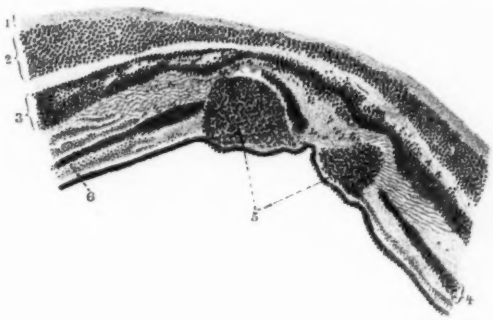

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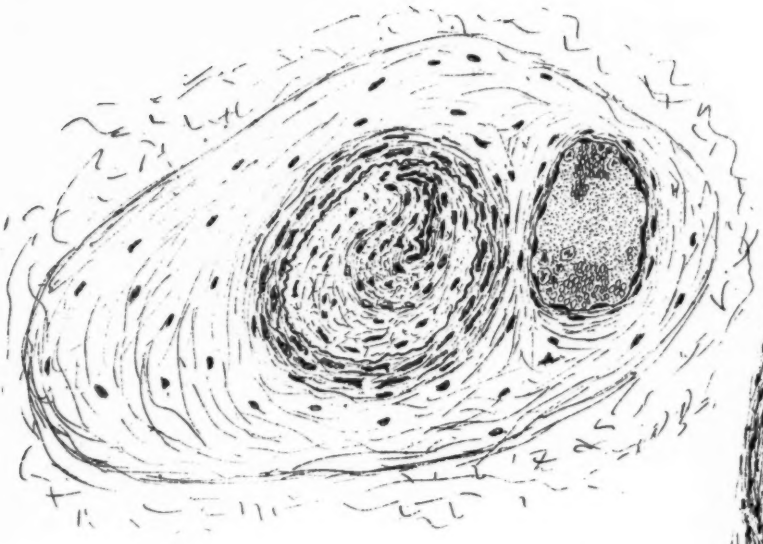

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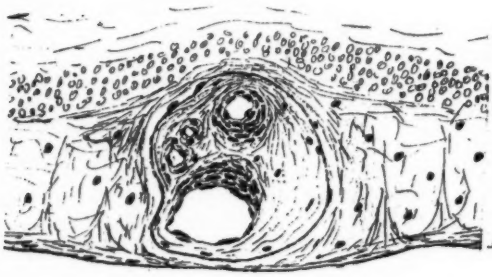

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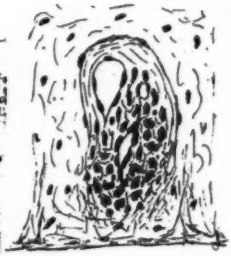

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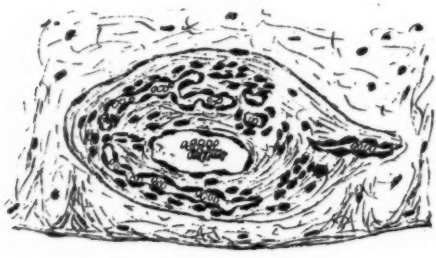

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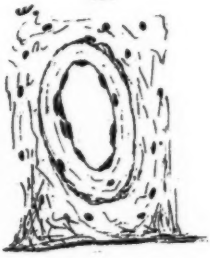

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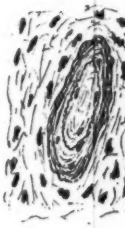

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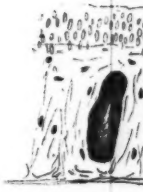

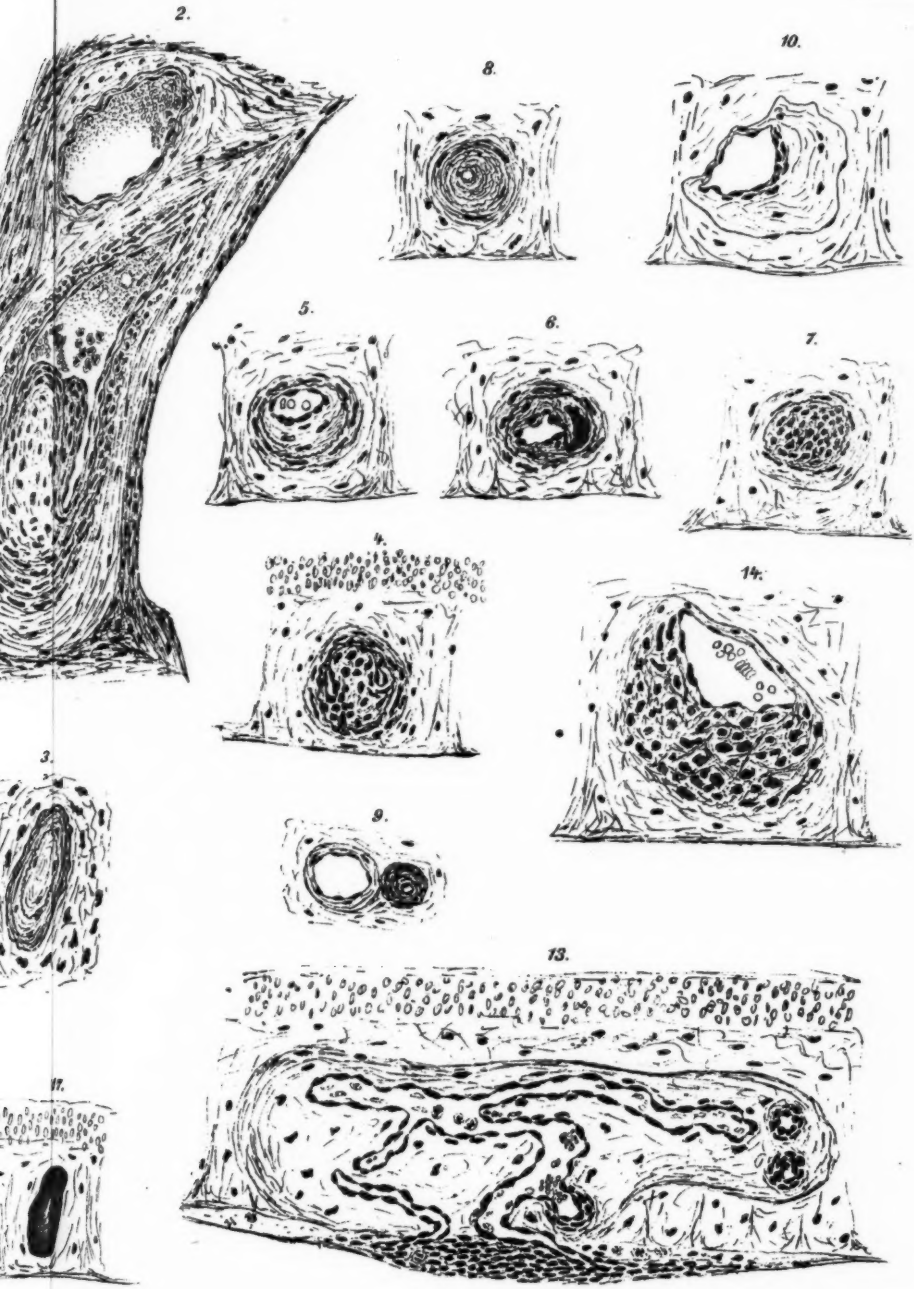

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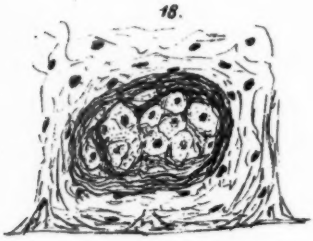

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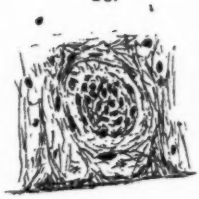

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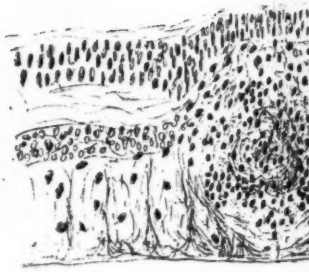

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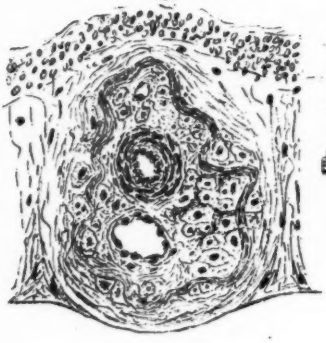

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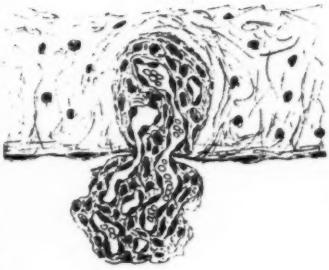

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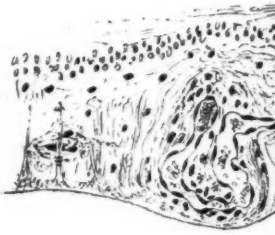

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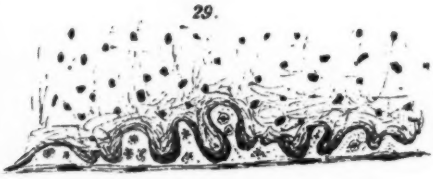

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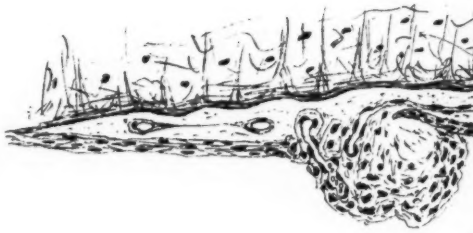

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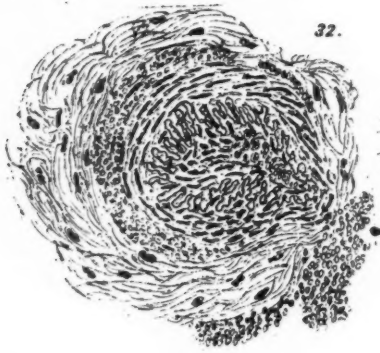

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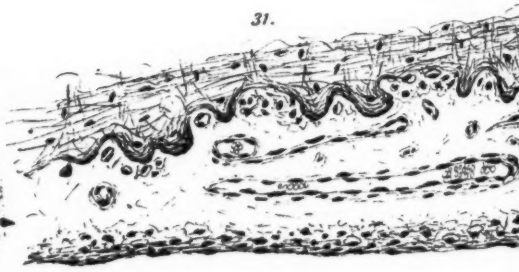

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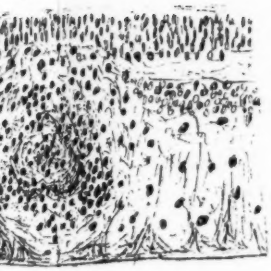

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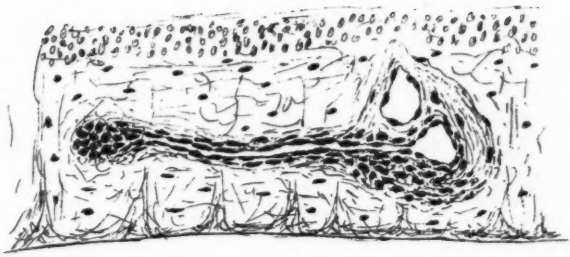

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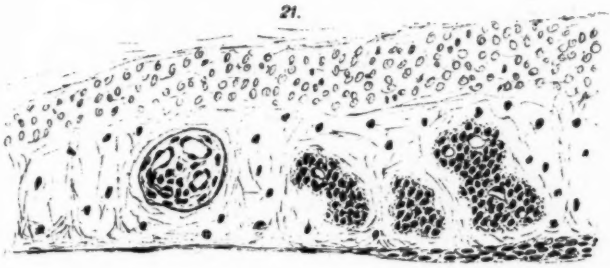

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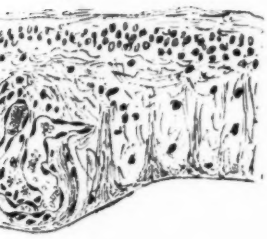

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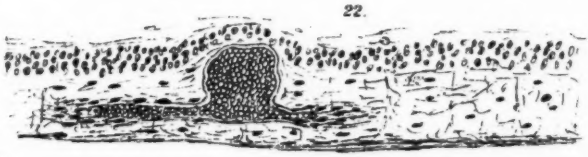

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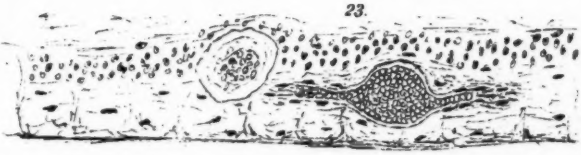

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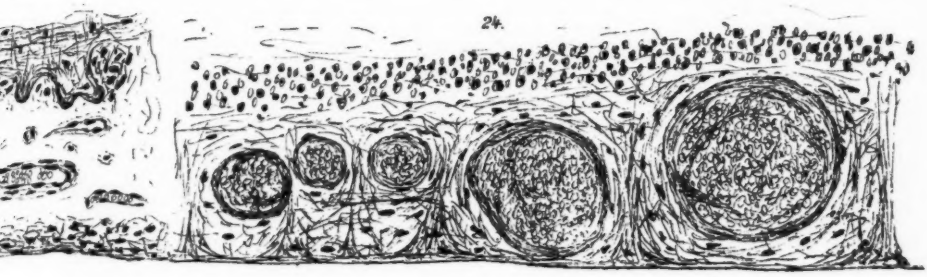

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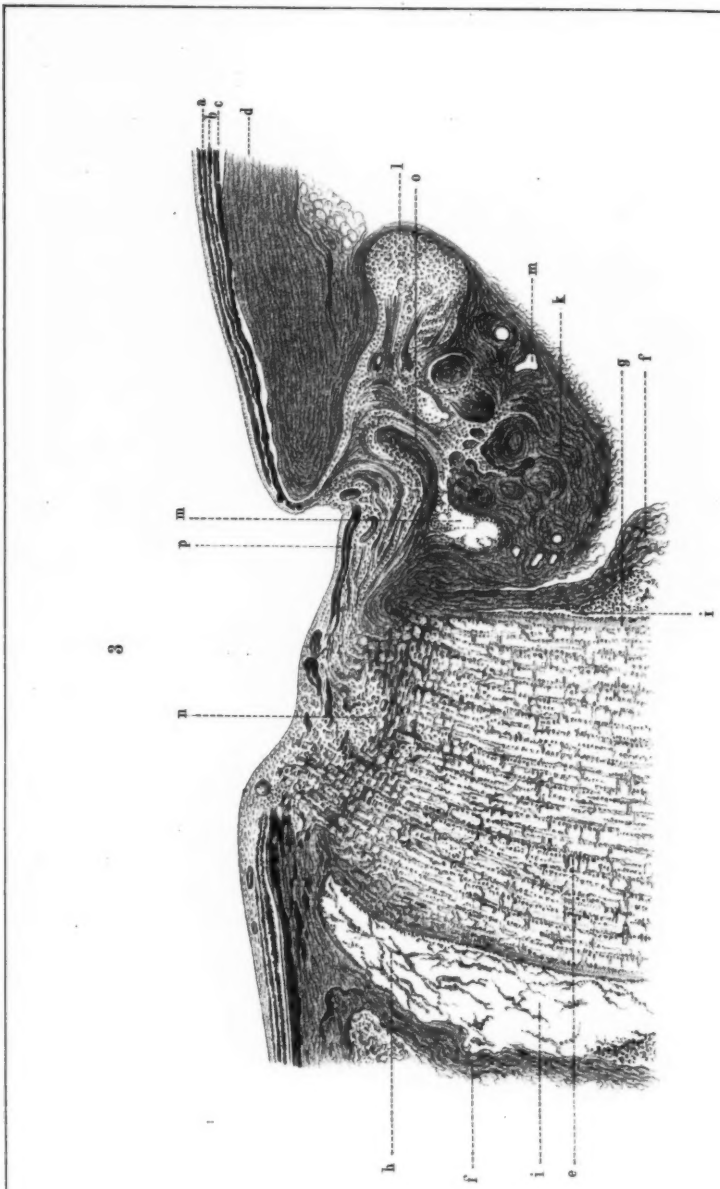
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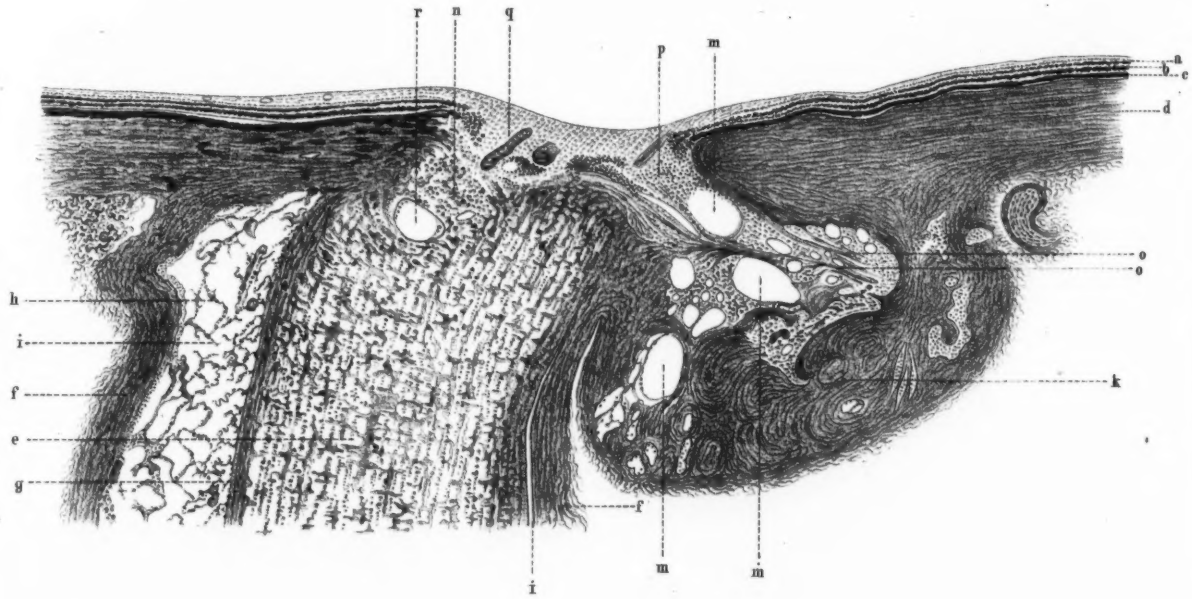

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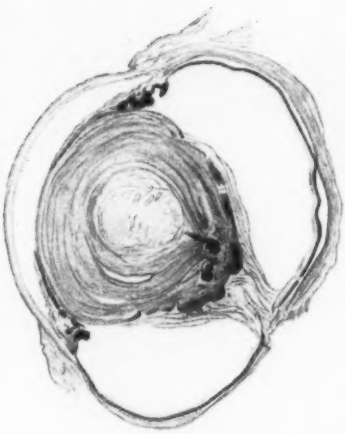
Fig. 1.



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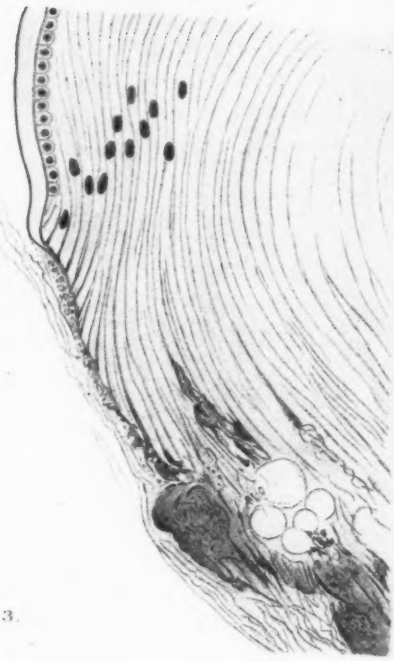

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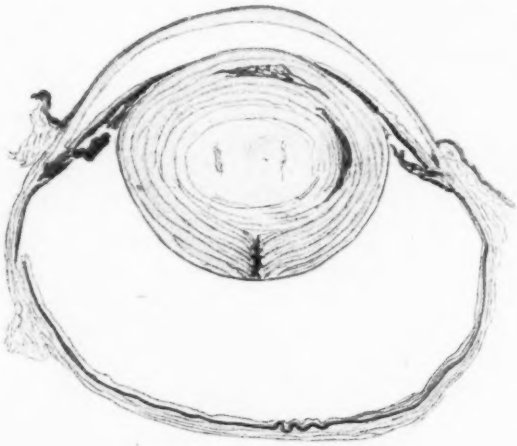

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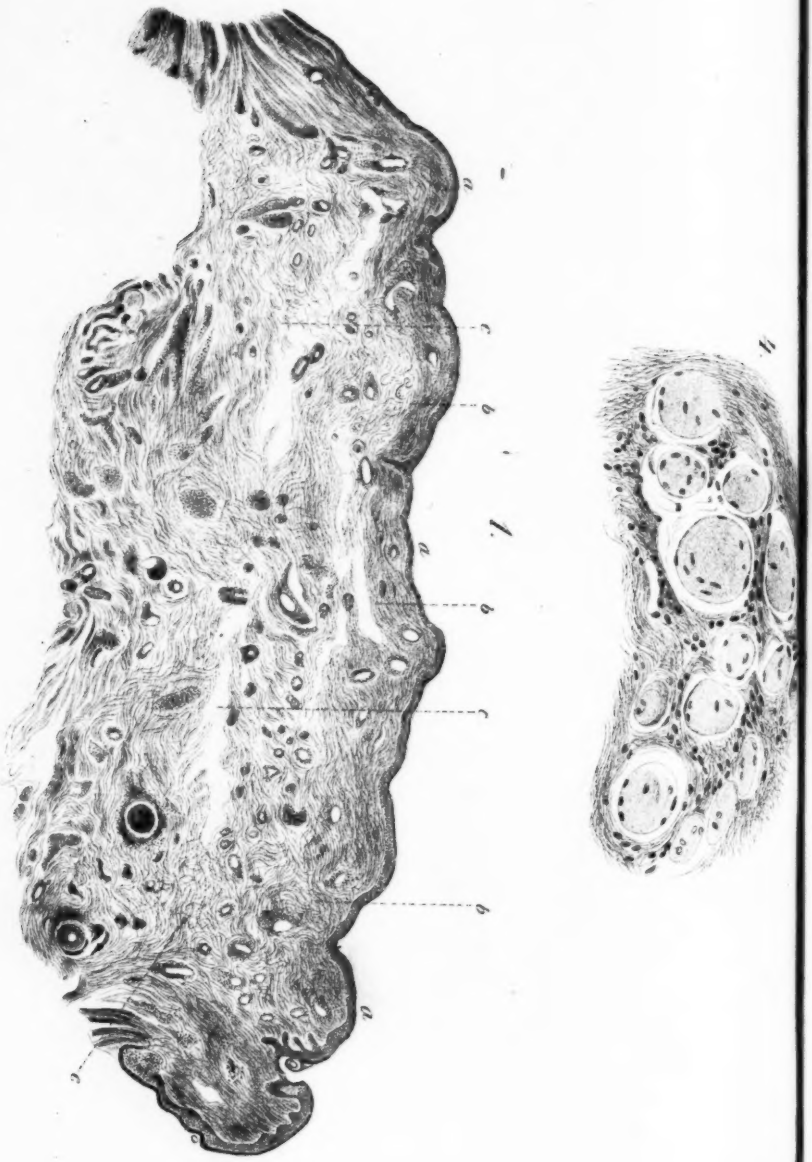

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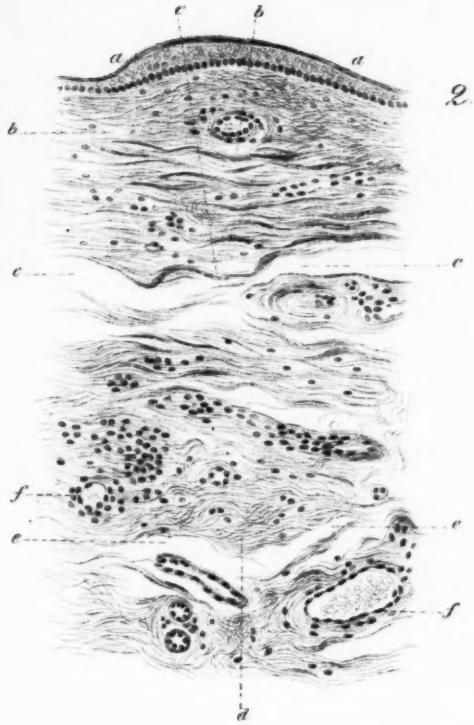

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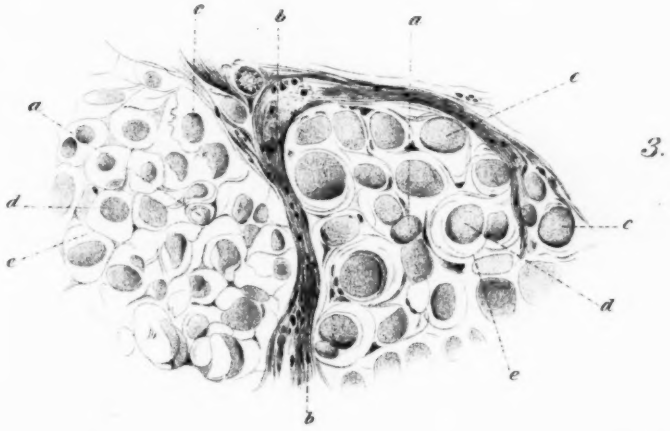

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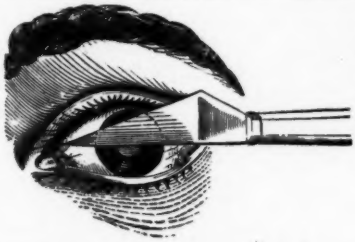

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